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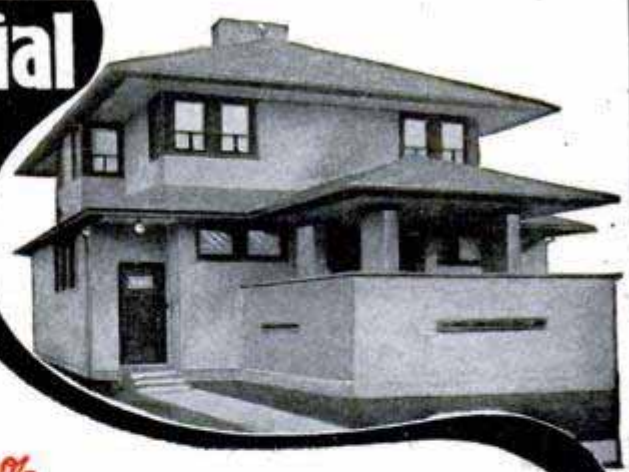
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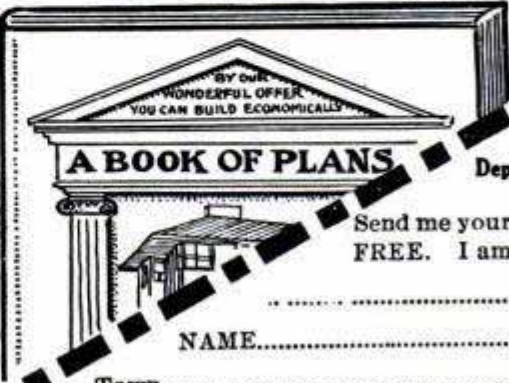
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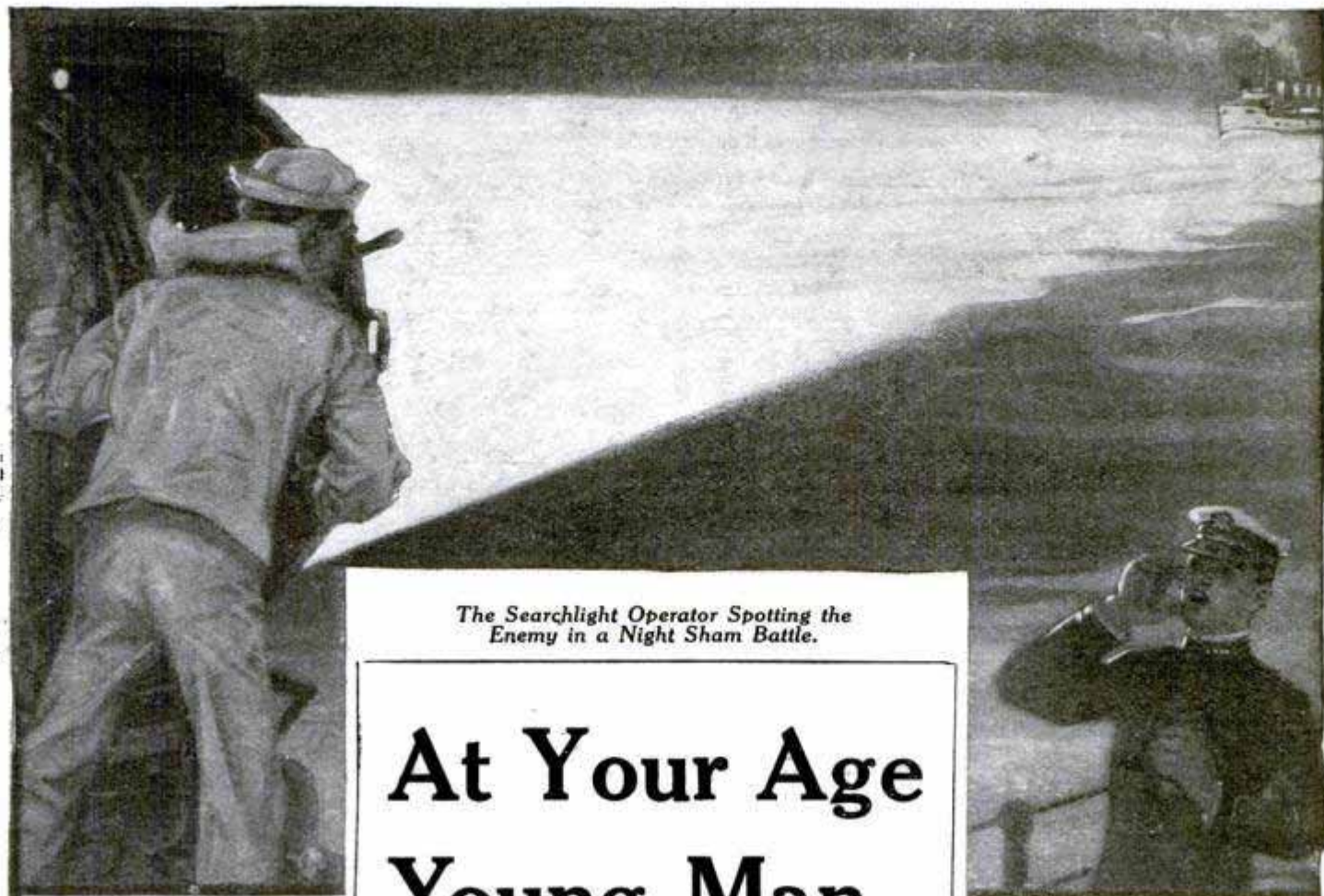
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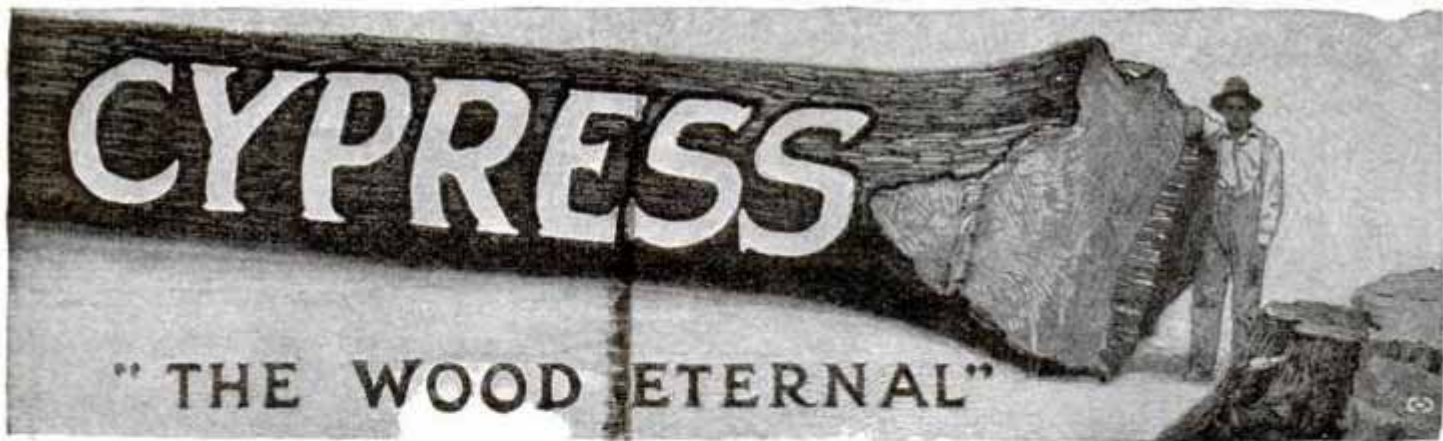
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Contents for January, 1913

Scots Still Test Skill with Ancient Caber.....	1	Gates Form Runaway Stopping Chute.....	46
White-Light Installation for Photographers.....	2	Flying Corps Asked to Try Parachutes.....	46
Trolley Car Bends in the Middle.....	2	Great German Protecting and Power Dam.....	47
"Magnet Bill" an Important Unit of an Auto Concern.....	3	Telephoning Fifty Miles by Wireless.....	48
Windmill Mounted on a Live Tree.....	4	Temporary Burial Place for Panama Chinese.....	48
Hiding an Army from Aerial Scouts.....	4	Glass Tubes Finer than Hair.....	49
Deer Impales Itself on Picket Fence.....	6	A "Boomerang" Blow-Pipe Glider.....	49
Lids for Funnels of Battleships.....	6	Automobile Headlight as Trouble Signal.....	50
Auto Delivery Wagon Looks Like Locomotive..	7	Portable Retort for Surgeons.....	50
Tungsten Lamp Burns in Spite of Collision.....	7	Memorial to "Titanic's" Wireless Operator.....	51
Cutting the Portholes in a Great Liner.....	7	A "Raincoat" for the Straw Hat.....	51
Enormous Loss of Water at Gatun Lake.....	8	Aeroplane Landing of Philadelphia Hotel.....	51
Use Telescopic Mast to Trim Trees.....	9	Pontoon Bridge at Bagdad.....	52
Explosives as Medicine.....	9	Pneumatic Woodcarving Tool.....	52
Police Zebras of German Africa.....	10	Electric Towboat Used on French Canals.....	53
Device Makes Engine Spark Visible.....	10	Raincoat Converted into Motorcycle Suit.....	53
Flying Motorboats the 1913 Sport.....	11	A New Type of Propeller.....	54
Motion-Picture Show in Passenger Station.....	12	England Loses another Submarine and Crew.....	54
Duck Shooting from Flying Motorboats.....	13	New Silencer for Motorcycle Engines.....	55
Gas Smokehouse for the Curing of Hams.....	14	Combined Mercury-Vapor and Tungsten Lamp...	55
The Advance of Shipping in the Last Year.....	14	Fragment of Armor Plate as Memorial.....	55
An Aerially Propelled "Water Bug".....	14	Four-Compartment Side-Dumping Motor Truck..	56
Apartment House Only One Story High.....	15	A Mechanical Anvil Hammer.....	56
Dressing the Faithful Light Buoys for their Stormy Winter Sea Service.....	16	Marble Mosaic for Windows.....	57
London to Have Subway for Postal Service.....	18	Primitive Well Boring in China.....	57
What the Popular Furs Really Are.....	18	Disinfector Motor Cars for Use in Germany.....	58
Stealing with the Heel of a Shoe.....	19	Uphill Safety Tracks Stop Runaway Trains.....	59
A "Perambulating" Machine Shop.....	20	Fireproof Clothes for the Future.....	60
Air Gun Stores Power for Sixty Shots.....	20	"Neptune" in a Hatteras Northwester.....	60
Elephants Haul Boiler Through Jungle.....	21	Oil-Barrel Origin of Automobile Shape.....	62
Motor Mail Collecting Made Easy.....	21	Corrugated Hulls for Battleships.....	62
Freight Transportation in Alaska.....	22	Collision of Auto Fire Engines Wrecks House...	63
New Last-Resort Method of Resuscitation.....	22	Concrete Slabs as Fine as Porcelain.....	63
Aeroplane Reports War Moves by Wireless.....	23	Dwarf Suspension Bridge in Long Service.....	63
London Has the Prize Freak Automobile.....	23	Testing the Gondola of the Brucker Airship.....	64
Huge Flagpole for Exposition.....	24	Best Wood Pulp Made by Dull Grindstones.....	65
Settling Cement Dust by Electricity.....	24	A Formidable Musical Instrument.....	65
Colossal Statues Carved from Single Blocks.....	25	Old Tank Rejuvenated by Use of Concrete.....	66
Trophy of Merit for Park Employes.....	26	Passenger Stations Have White "Dead Line".....	66
The New Safety Rules for Transatlantic Liners..	26	Submarine Wrecked in the Surf.....	66
Aviation Now as Safe as Football.....	27	Jack-and-the-Beanstalk Chain Trick.....	67
Far-Flung Messages of Government Wireless.....	30	Coals Identified by Coking Test.....	68
Comment and Review.....	31	Scouting the Border on a Motorcycle.....	69
By H. H. Windsor		Phosphorescent Fish of the Deep Sea.....	69
Eighteen Tons of Iron Lost Daily by Rust....	35	Two Motion-Picture Shows in One Theater.....	70
Voting Tents Used in Los Angeles.....	35	A Mono-Gyroplane Built for Ocean Trip.....	70
Scenes Attending the War in the Balkans.....	35	Binnacle with Double Lighting System.....	71
Progress Markers in the Aviation Show.....	38	Correct Stair Climbing Taught Children.....	71
By Victor Loughheed		Sustaining Life with Cold.....	72
A Ten-Story Office Building Collapses.....	41	By Al. H. Martin	
The Government as an Express Company.....	41	Alaskan Steamer High Aground.....	73
Hydro-Aeroplane Launching Ways for Battle- ships.....	42	The New Military Double-Seated Monoplanes...	73
Portable Control for Electric Cranes.....	43	Turbine Yacht Resembles Torpedo Destroyer...	74
Krupps Subject Guns to Severe Tests.....	44	Draft Producer for Chimneys.....	75
		Electric Power Plant for the Kitchen.....	75
		Glass-Bottomed Boat for Sea-Formation Study..	76
		New Specifications for Scouting Aeroplanes....	76

[Continued on Page 6]

Popular Mechanics offers no premiums; does not join in "clubbing offers," and employs no solicitors to secure subscriptions. It is for sale by nearly every newsdealer in the United States and Canada.

Contents—Continued

Pumping Tires from Propeller Shaft.....	77	A Countersink.....	122
New Lighting Unit Gives Wide Distribution....	77	A Brush Bridle.....	123
An Ingenious German Electric Bell.....	78	A Gasoline-Engine Valve Lifter of Large Capacity.....	123
Target Practice of the Atlantic Fleet.....	78	To Make Cement Tests.....	123
Electric "Daylight" Egg Tester.....	78	Packing Flour in Sacks.....	124
Leather Holder for Spare Wheels.....	79	A Sandpaper Stick.....	124
Bicycle Hanger on French Police Automobile....	79	Bands for Pipe Covering.....	125
Special Telephone Set for Paralytic.....	79	Spraying Insulation Liquids into Armature Windings.....	125
Street Ferries for Use at Crowded Crossings....	80	Cooling a Hot Bearing.....	125
Electricity Pumps Water to Irrigate Rice.....	80	Oil-Can Holder for an Automobile.....	126
Spotting the Antics of Distant Cyclones.....	81	A Tube-Cutting Tool.....	126
Electric Current from Bicycle Wheel.....	82	A Knife for Extracting Slivers.....	126
New Form of Insert for Concrete Walls.....	82	A Private Ice House.....	127
A "Fore-and-Aft" Direction Indicator.....	83	Antidotes for Poisons.....	130
Exchangeable Hard-Steel Treads for Rails.....	83	A Line Spreader.....	131
Gyroscopes Tested on U. S. Destroyer.....	83	Homemade Registering Gauge for Liquids.....	131
Thermometer Represents Costly Research.....	84	To Hold the Ends of Boards on a Small Strip....	131
Growing Tropical Fruits in Washington.....	85	Straightening a Motorcycle Fork.....	132
Pitless Turntable for Automobiles.....	85	Laying Out Sections for a Hollow Metal Ball....	132
Boats for Paris Streets in Case of Floods.....	85	An Unusual Conduit Crossing.....	132
Traffic Semaphores for Busy Crossings.....	86	Painting Concrete.....	133
Distribution of the "Titanic" Fund.....	86	Rotary Cutting Tool for a Wood-Turning Lathe....	133
Combination Twenty-Four and Twelve-Hour Watch.....	86	Radiating Bend in a Stovepipe.....	134
Combined Electric Comb and Curling Iron.....	87	Center Rest for Long Milling-Machine Work....	134
Pen-Pulling Device.....	87	Temporary Repair on a Valve.....	134
Automobile Jack that Fits Small Space.....	87	Repairing a Leak in a Water Jacket.....	134
An Automatic Door Handle.....	88	Starting a Tap True with the Work.....	135
Ordinary Camera Made Stereoscopic.....	88	Wagon-Tire Fasteners.....	135
Automobile Provided with Rudder.....	88	Protecting Windows While Painting.....	135
Aeroplane-Wing Covers Made of Steel.....	89	Valve for a Gasoline-Tank Vent.....	135
Prize-Winning Design for Safety Lamp.....	89	Drawing Board for Long Drawings.....	136
Valve-Closing Electric-Connection Box.....	89	Square Attachment to Determine Die-Clearance Surfaces.....	136
How to Predict Changes in the Seasons.....	90	Wire Joints Soldered with Heat from a Motorcycle Engine.....	136
Simple and Effective Insulator.....	90	Cutting Circles without a Compass Saw.....	136
"Hounds and Hares" Game on Motorcycles.....	91	Eye Shield for Gun Sighting.....	136
Growing Flowers that Will Keep Fresh.....	91	How to Make a Fluting Machine for Small Columns.....	137
Manicuring an Ocean Liner at Her Dock.....	92	Air-Cooled Commutator Brushes.....	139
Using Eggs as Germ Destroyers.....	92	An Emergency Four-Jawed Chuck Made of a Faceplate.....	139
Incandescent Mantles for Automobile Headlights..	93	Storage-Bin Marker Plate for Twist Drills.....	139
German Wingless Aeroplane.....	93	Connecting Ends for Coil Springs.....	139
Oldest Railroad Ticket Office Still Stands.....	93	A Vegetable Slicer.....	140
How the Spider Uses Structural Principles Like a Skilled Engineer.....	94	An Anvil Calking Tool.....	140
By J. E. Murphy		A Paint-Pot Stand.....	140
Giraffe Marked Like a Picture Puzzle.....	98	AMATEUR MECHANICS	
Shipping Gold Across the Atlantic.....	98	A Flash-Light Telegraph on a Kite Line.....	141
Removable Linings for Hospital Ambulances....	99	Hangers for Barn Tools.....	141
Our Canal Builders to English Eyes.....	99	Guide Ropes on a Bobsled.....	141
Two-Span Aerial Railway in Rio de Janeiro.....	100	Brush Hanger for a Dark Room.....	142
Artificial Cow's Milk Made from Beans.....	101	Lighting a Basement Light.....	142
Fir-Tree Odor Disgusts Boll Weevils.....	102	Projecting Protractor Readings.....	143
Spiral Stairs Converted into Freight Chutes....	102	A Door Stop.....	143
Machine to Make a Rug a Minute.....	102	Time Indicator for Medicine Bottles.....	144
Farman Biplane Has Detchable Cabin.....	103	A Washtub Stand.....	144
New "Safety" Crank for Automobiles.....	103	Pipe Used as Leather Punch.....	144
Aerially Propelled Bicycle Sledge.....	104	To Prevent Oilcloth from Cracking.....	144
Diesel Type of Engine for Farm Tractors.....	104	Combination Lock for a Drawer.....	145
Detroit's Dog-Catching Automobile.....	104	How to Start Small Machine Screws.....	145
Queer Monoplane Has Japanese Engine.....	105	An Umbrella Holder for Display Purposes.....	146
Paper Insulation Lasts Twenty-three Years....	105	Holder for a Milk Card.....	146
Hundred-Foot Log Bridge Spans River.....	106	Frame for Printing Post Cards from Negatives....	146
Leaded Silk as Safeguard for X-Ray Operators....	106	Finger Protection on Laboratory Vessels.....	146
Opening the Way for Glass Houses.....	107	A Novel Show-Window Attraction.....	147
Anti-Hatpin Crusade in Bavaria.....	108	How to Make a Mop Wringer.....	147
"Explosion" Locomotives for Desert Railways....	108	A Vise Used as a Caliper Gauge.....	148
Orchard Tractor Driven by Boy.....	108	Homemade Tack Puller.....	148
Studying the Colors in Brick.....	109	How to Make a Radium Photograph.....	148
Impressions of Aeronaut Turned Airman.....	110	Pulling Wire Through Curved Electric Fixtures....	149
New Superdreadnought Launched in England....	110	An Automatically Closing Drawer.....	149
Measure Wind Velocity with Electricity.....	111	A Cork Puller.....	149
Under-Water Signal System for Navy.....	111	Uses for a Bamboo Pole.....	149
Motor-Car Lock Grips Clutch Lever.....	111	Making Common Lock Less Pickable.....	150
Repairing Arteries with Glass Tube.....	112	To Prevent Corks Sticking in Bottle Necks....	150
Motor Cars Two to One on Massachusetts Road....	113	Eraser Holder.....	151
British Military Biplane of Advanced Type.....	113	A Soap Shake.....	151
Great Rock Resembles Human Head.....	114	Ear Repair on a Bucket.....	151
Bullock Power on Roof of Turkish Bath.....	114	Cleaning Dirt from Tufts in Upholstering.....	151
Is Your Intended Home Well Built?.....	115	Substitute for a Rubber Stamp.....	152
By M. W. Douglas		A Hanging Vase.....	152
German "Air-Yacht" Club Pennants.....	120	Locking Screws in Door Hinges.....	152
Operating Hotel with Telautograph.....	120	Patents Practical or Unique.....	
SHOP NOTES		153	
A Wagon Brake.....	121	Jokes.....	
To Keep a Reserve Supply of Gasoline in a Tank..	121	154	
To Fasten Covers on Shipping Boxes.....	121		
New Form of Dry Battery for Long Life.....	122		
Applying Gravel to Roads with a Manure Spreader.....	122		

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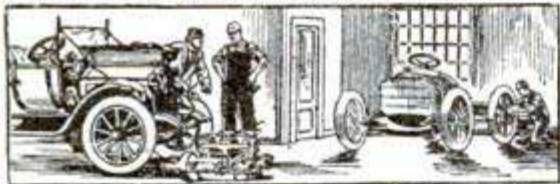
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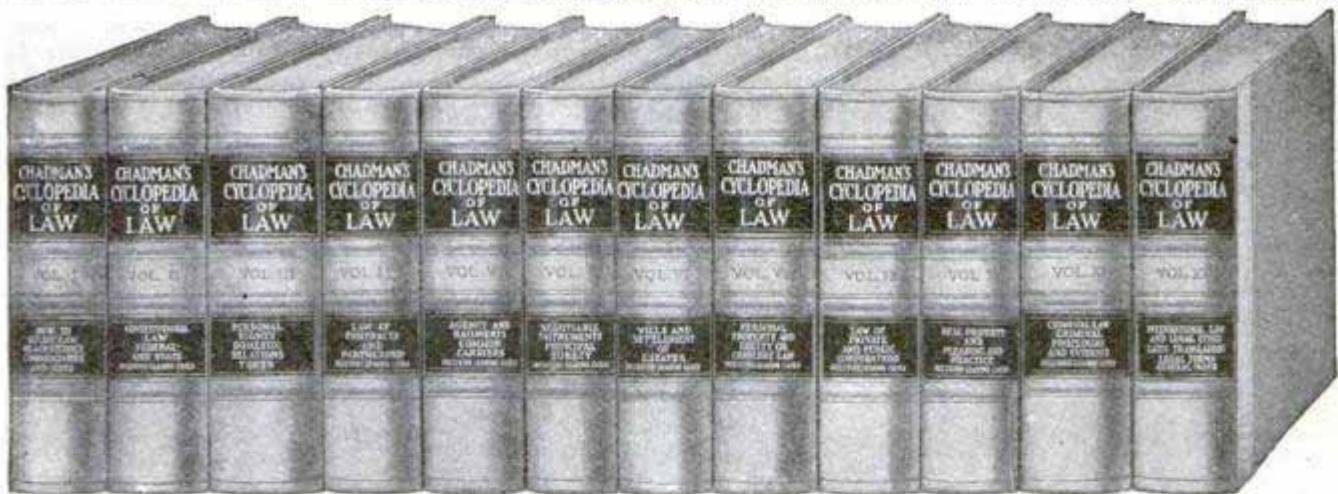
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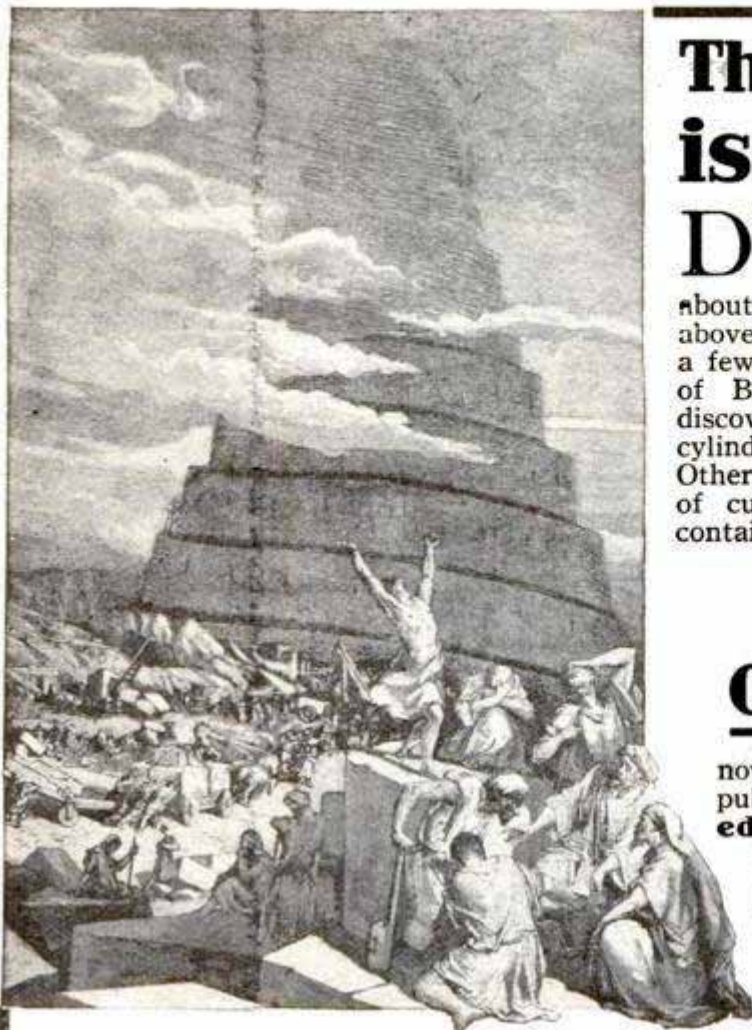
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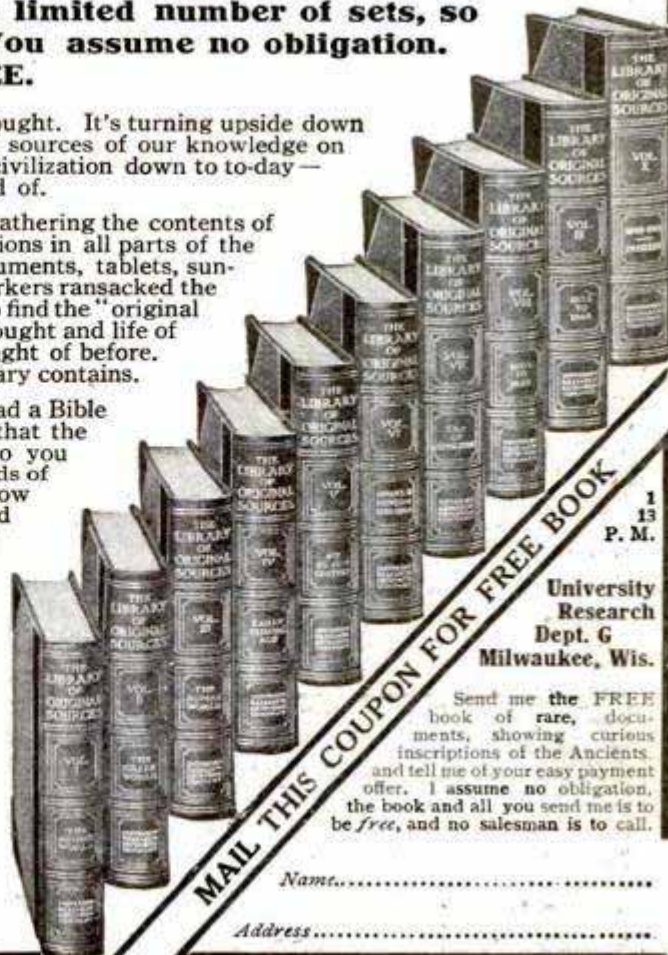
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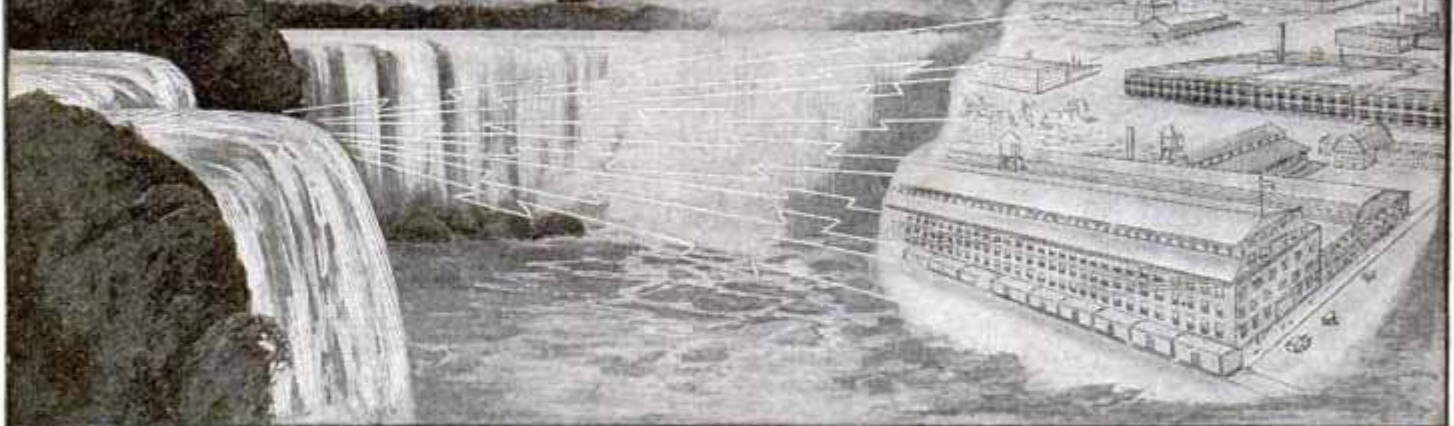
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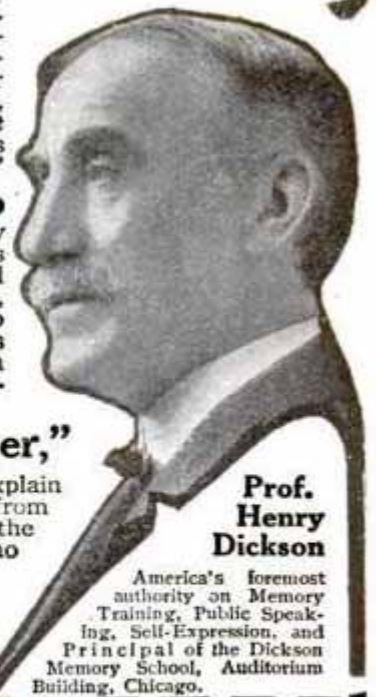
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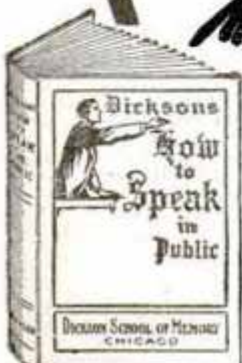
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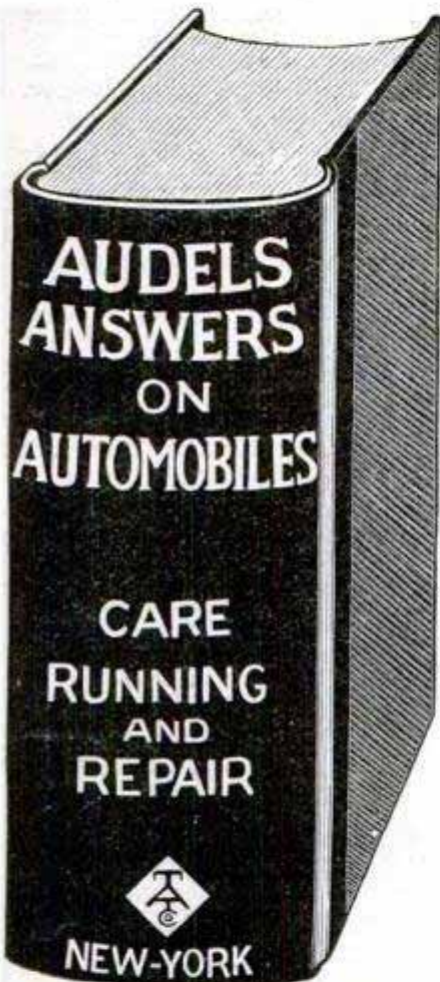
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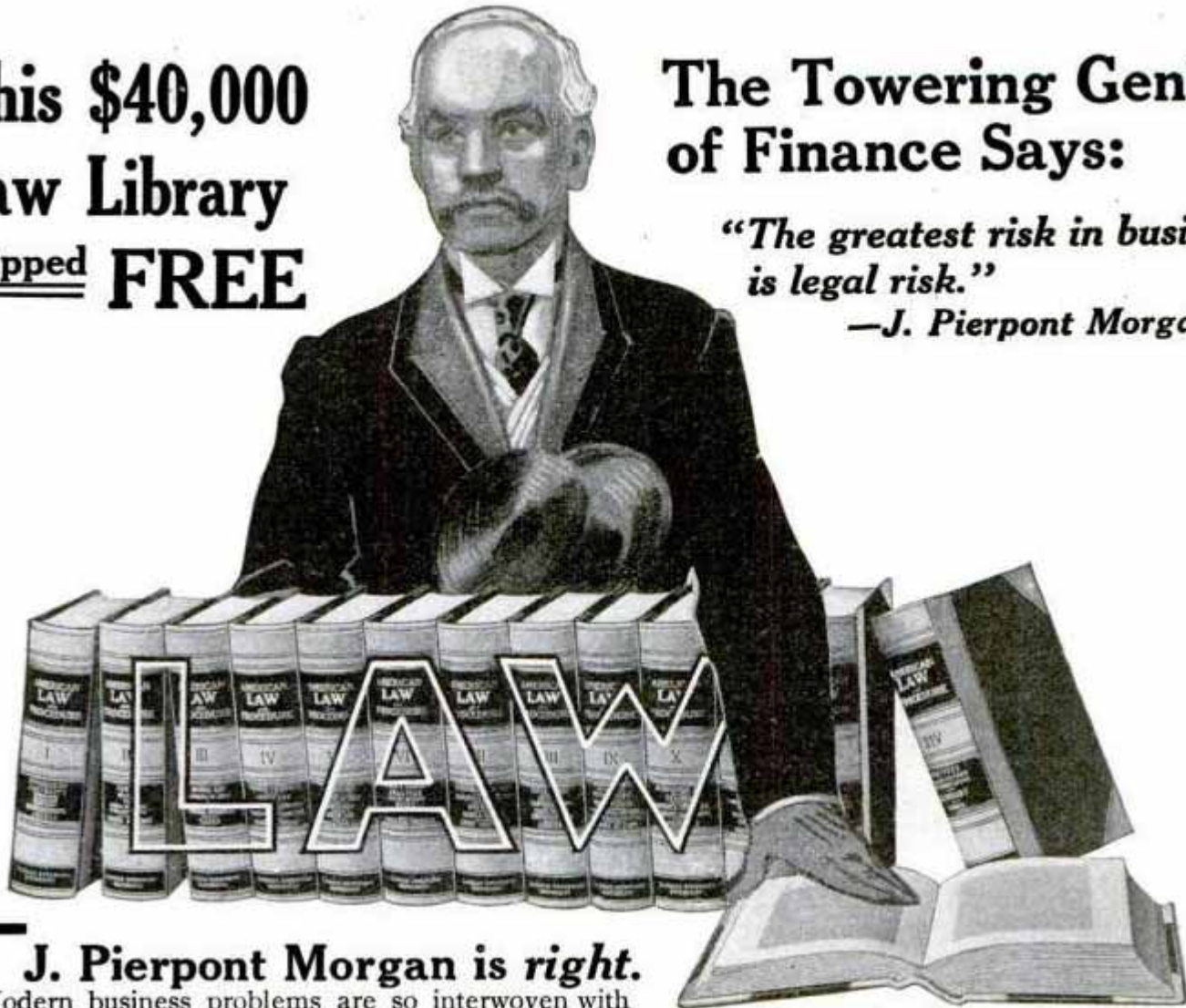
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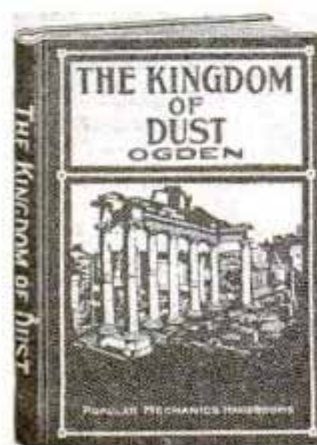
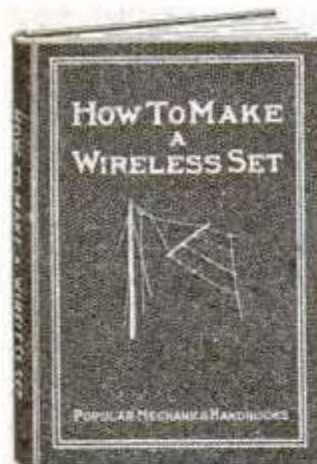
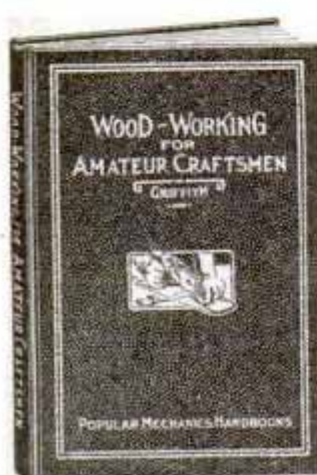
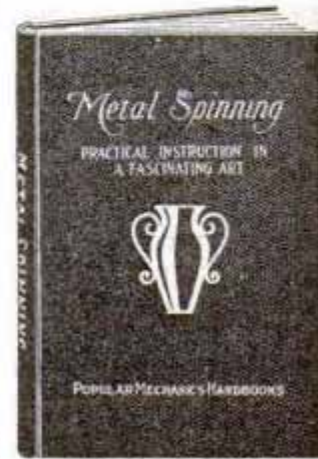
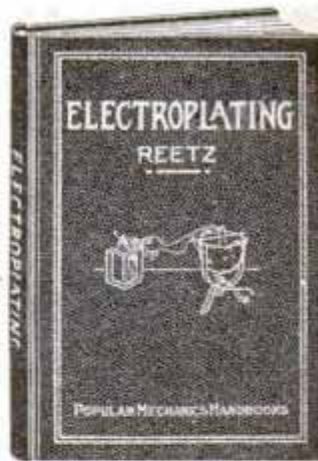
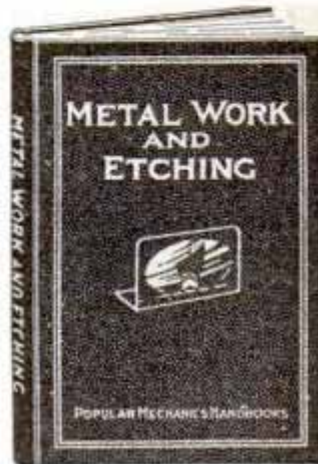
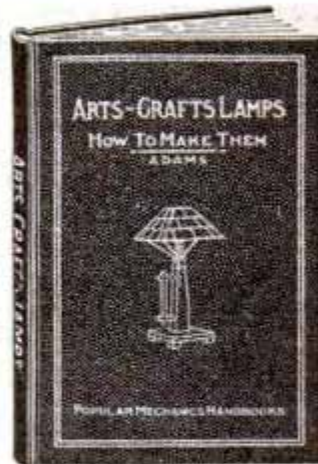
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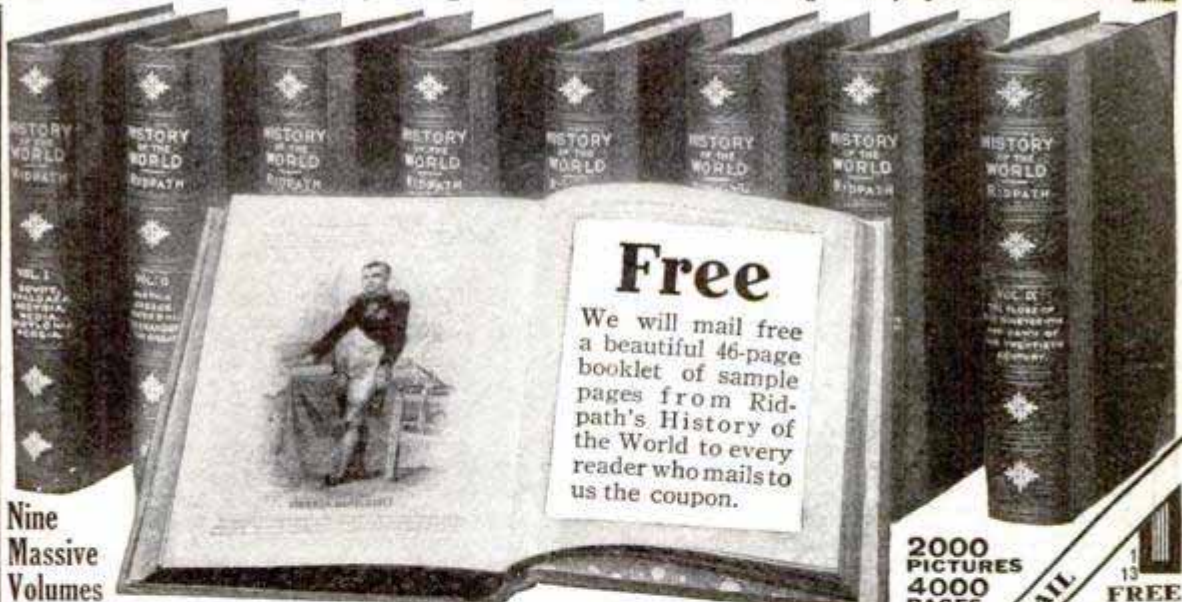
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BIG Profits for You! Manufacture Barley Crisp. New confection. 5c package sells you 1c. Machine, instructions complete \$7.50 prepaid. Send 10c for samples. Arley Crisp Co., 1605 Hyde St., San Francisco.

MAIL order ads that pay. 20 different propositions fully explained. All bona fide, no fire money-getters. Each one the foundation of a successful Mail Order business. Send 10c for full particulars and regular bulletin of new propositions. Mail Dealers Wholesale House, 450 Franklin Bldg., Chicago, Ill.

FACTORY site for sale at a great bargain. Saw Mill complete; 80 horse power boiler and 65 horse power engine, on deep water; good railroad facilities. Worth \$500. Will sell for \$1,500. One-half cash, balance \$25 per month. Address, Deamont Mfg. Co., Laine, Mississippi.

HAVE you anything to advertise? Our Rate Book tells you all about advertising mediums, rates, circulation, closing dates, etc. Sent for 10c. Worth dollars. Folder free. Correspondence invited. Dearborn Advertising Agency, 455 Franklin Bldg., Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time, no canvassing. I furnish everything and guarantee success. Send for proofs. Voorces, Desk C. R., Omaha, Neb.

BE a Mirror Expert. \$3-\$10 day; spare time home at first; no capital; we train, start you making and silvering mirrors; French method. Free prospectus. W. P. Herr, Pres., 87 Saratoga Ave., Brooklyn, New York.

BE Independent. Start Money Making Mail Order Business at Home. New Plans, everything furnished. Only small capital required. Free booklet and particulars will show. W. P. Miller Co., Box 254, Muskegon, Mich.

I WILL start you earning \$1 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, showing plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

MANUFACTURE Gold Letters for signs—60 per month easy. I start you. Experience unnecessary. Take like wildfire. Prospectus free. J. F. McPherson, 673 Owen Avenue, Butler, Pa.

MAKE \$100 to \$500 a month and get it in the 7 o'clock crowd. Opportunity for a life-time. Free particulars. Address: Estate Correspondence Schools, 1528-Masonic Temple, Chicago.

BE Your Own Boss. Start mail order business. We teach you. 20 years established. Everything furnished. "Starter" free. Krueger Co., Dept. 2B, 167 W. Washington, Chicago.

MECHANICS—Tinsmiths. Make money this winter making lamp heaters at a cost of 10 cents each. Directions and blue print, one dollar. Crawford, Bedford ad, Schenectady, N. Y.

PATENTABLE ideas wanted—Send for free books. Richard B. Owen, 30 Owen Bldg., Washington, D. C.

MAKE More Money! Operate a good substantial Mail Order Business—our "Silent Salesman" system—can easily be done in spare time yet the possibilities are unlimited! For years "Booster" has actually and accurately led thousands like you over the Successful Road to Wealth. To succeed you've got to read The Booster Magazine for "Booster" is Opportunity and starts you in business for yourself—tells you how to get the dollars—puts you next to the best money making propositions on earth—ones that really get you the money! Send 10c for two months trial subscription. Booster Magazine, Northwestern Building, Chicago.

I WANT you to handle "Successful Brains" and my other Mail Order books—they are the best on earth—millions of copies should be sold on merits alone—fortunes should be made by those who heed their teaching! Write me and I will make it to your advantage to sell these, my newest and best books by furnishing you circulars and books at the right figure. May I send you confidential Mail Dealers' prices? Weissgerber, Northwestern Building, Chicago.

EXTREMELY small capital starts a sensible, legitimate and profitable mail order business. If you are, or you intend to become a mail dealer, answer this ad; you receive proof, facts and details how you may start a clean and independent business with \$10. Address Expert, 420 Home Bank, Baltimore, Md.

AGENTS wanted: Men or Women now employed to work one hour a day to sell "Clearall." Indispensable for storekeepers, railroads, street car Cos., automobilists, etc. Quick seller, 100% profit. Send 25 cents (coin) for large sample and full details. Northern Laboratories, Chicago.

MAIL Order Firms. Commission circulars insuring matters \$20 on every thousand mailed. Books on Success, Self-Culture, etc., 25c, sample 12c. Successful plan free. Popular Institute, Englewood, Chicago.

PATENTS Secured—C. L. Parker, 910 G St., Washington, D. C.

MAKE \$10 daily restoring colors to faded rugs and carpets. Spare time. Tremendous opportunity everywhere. Simple; easy. Mirror silvering course free. Free particulars. Cox, Dept. MC., Omaha, Neb.

YOUR opportunity to become manufacturer. Product international necessity. Profitable business quickly established, at home, during spare time. Sample and particulars. Delzell Mfg. Company, Desk A, 448 South Mathews, Los Angeles, California.

LEARN to Metalize. Make exquisite and beautiful jewelry of roses, butterflies, etc. Pleasant, profitable employment. Stamp brings sample and particulars. P. Benson, Stewartville, Minn.

GOOD Results. Greatest Mail Order Magazine published. Two \$50.00 Courses now being published. Three issues, 10c. Publishers, 2311PM North 43 Av., Chicago.

\$10 TO \$20 a day without canvassing. Most stupendous merchandising plan ever conceived. Write quick. Ziebart, 3232 Rhodes Ave., Chicago, Ill.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Mutual Opportunities Exchange, Buffalo, N. Y.

OPERATE Hahn's Premium Machines. Let them gather pennies for you. The best seller for cigars and candies. J. L. Hahn, 1016 Germantown Ave., Philadelphia, Pa.

FORM a corporation—Congress Law for D. C. and all States; cheap. Raise money easily. U. S. Legal Corporation, Washington, D. C. Representing \$1,225,000,000.

MANUFACTURE and control exclusively best Mechanics Hand Soap Made. Fortune in it for you if you hustle. Complete course \$1, with ten 10c boxes soap free. J. C. Brown, 50 Chestnut Ave., Auburn, R. I.

TRIAL Offer: \$1.00 places your 25 word ad in 200 magazines; regular price 6c per word. Kings Magazine, Box 13 P., Little Silver, N. J.

BUSINESS opportunities for you—with money making methods in Digest you can make \$\$\$! One year subscription only 25c. Digest, Grand Rapids, Mich.

BEST Cream Metal Polish ever made. Complete instructions, formula and one gallon Polish for \$1. J. C. Brown, 27 Washington St., Providence, R. I.

MAIL Order Business, I start you free. No investment but postage and stationery. P. Newham, Waukegan, Ill.

TURN your spare time into money. Join us in a profitable mail order business, one that you can operate at home. Large profits; quick returns; small investment. Our 10 years' successful manufacturing experience, personal assistance and new ideas assure your success. Write for positive proof and free booklet. Pease Mfg. Co., incorporated, 144-148 Broadway, Desk A, Buffalo, N. Y.

NICKELPLATING done at home. Big profits. Mail 25c for sample bottle and particulars. Eynon Mfg. Co., 2773 West 15th Street, Cleveland, Ohio.

GET into the Oxy-Acetylene Welding Business. Needed everywhere, an unlimited field and enormous profits. We furnish full instructions and blue print plan for building your own plant at low cost. Write at once before your territory is taken. Price, \$1.25 postpaid. J. M. Crowner, 113 So. Schuyler St., Ottumwa, Iowa.

BE Independent. Make \$50 weekly with a New Invention, just patented. 8c profit on every dime. Small investment. Experience unnecessary. Circulars mailed free. International Metal & Ferrotyping Company, Dept. B16, Chicago, Ill.

INCORPORATE your business under Arizona laws. Cost small. No franchise tax. Stockholders exempt from corporate debts. Do business anywhere. Laws and forms free. Southwestern Securities & Investment Company, Box D488, Phoenix, Arizona.

COLLECT money by a sure, simple, system. Income \$1,000 to \$5,000 a year. Quick results. No capital required. Instructive book. "Skillful Collecting," free. National Collectors Ass'n., Long Street, Newark, Ohio.

YOUR Opportunity—Work for yourself; 200 money making formulas for 25c, including the famous resilvering mirror formula. The Hoover Co., Dept. 7, 529 E. Beck St., Columbus, O.

ENCYCLOPEDIA of Business Chances. Money making methods exposed; how small ventures lead to wealth; 2,000 trade secrets, etc. Descriptive booklet free. Reimel & Co., 96 Broadway, N. Y.

MAIL Order Business in its true light and particulars showing how you can obtain a loan of advertised mail order instructions and "schemes," sent free on request. Library Division 29, The Mail Order News, Fishkill, N. Y.

"THE Art and Process of Dry Cleaning." A fascinating and profitable occupation. 25 cents postpaid. Auburn Supply Co., Dept. EE, 7716 Peoria St., Chicago.

FORMULAS furnished by expert chemists, for manufacturing Toilet, Household, and Technical products. Government serial numbers obtained. Catalogue for stamp. B. Mystic Company, Washington, D. C.

MONEY for You. Learn the "Dry Cleanings" business. Formulas and complete instructions, 13-2c stamps. Profitable Service Bureau, 4333 N. Sawyer Ave., Chicago.

SPARE Time Money Maker. Unlimited possibilities. Little capital required. Complete instructions and sample 25c. Particulars free. P. Akorn, Rosebank, New York.

WE Help Raise Capital at once to start you in retail—manufacturing—patent—real estate—mail order or any legitimate business by means of "Our Practical Method." Particulars free. The Business Aid Co., K501, Detroit, Mich.

EARN from \$10 to \$15 a day refinishing and waterproofing automobile tops with "No-Crack" waterproofer. \$2 per can express prepaid. Write Brinkley Bros., 726 E. 15th St., Kansas City, Mo.

AN intelligent person may earn \$100 monthly corresponding for newspapers. No canvassing. Send for particulars. Press Syndicate, 700, Lockport, N. Y.

GET money in every mail. \$1 starts profitable mail order book business. Particulars free. H. J. Teeple, Decatur, Ind.

WE Start You in Business, furnishing everything; men and women, \$30 to \$200 weekly operating our Original "New System Specialty Candy Factories," home or small room anywhere. Opportunity lifetime; booklet free. W. Ragsdale Co., East Orange, N. J.

SHEET bluing, mending tissue, gold eyed needles, for trust plan and mail order dealers. Three samples, 10c. Frank Shilling Co., Navarre, Ohio.

I Made \$50,000 in five years with a small mail order business; began with \$5. Send for free booklet. Tells how. Heacock, 5074, Lockport, N. Y.

SELL your formulas, ideas, plans and knowledge by mail. Some make \$1,000 monthly. Instructive booklet for stamp. Information System, 283, Marietta, Ohio.

YOUR Brain can make \$200 while your muscles make fifty cents. Write for proposition. Dunning, Aulander, N. C.

BEFORE Starting Mail Business or accepting agency, ask me about my "Money-makers." A Rolfe, 923 N. Alder, Philadelphia, Pa.

144 PENCILS with your four line ad, only \$1.90 prepaid. Crescent Pencil Co., Tibodaux, La.

WORTH \$ \$ \$—How to succeed in the Mail Order Business, free. M. Hathaway, Rolling Prairie, Ind.

MAKE \$1 earn \$50. Razor Blade Sharpening pays large profits. Easily handled in spare time at practically no expense. Three million owners use four million blades weekly. Big demand for sharpening. Booklet "How to Operate a Sharpening Business" free. What others have done you can do in your town and by mail. Nice money making opportunity for those who apply now. G. A. Haynes, Boston, Massachusetts.

MAKE \$50.00 to \$100.00 monthly. In your spare time—Experience unnecessary. Want active man each locality. Insurance Benefit Protection for sickness, injury, death. Write for Cash-Bonus offer. Box No. 293, Covington, Ky.

START a credit reporting office, every merchant needs and will pay for this service. You can make money. Field new and white for the harvest. No capital required. Ask for booklet. Free. National Protective Service, Uhrichsville, Ohio.

FREE information and instructions on the mail order business. Our publication tells how to successfully operate mail order plans; gives "truthful" advice and opens a way for you to win. Sample copy free. Big Mail Directory, 1124-P Foster Ave., Chicago.

GUARANTEE anyone \$50 weekly from start, without capital. Salary if desired. No canvassing. Something new. Better investigate quick. Make your spare time profitable. L. M. Todd & Co., Dept. 6, Holladay, Va.

EARN \$7 to \$12 daily, restoring faded colors in rugs and carpets, whole or spare time. No capital. Free Booklet, tells how. Wm. A. Eldred, Dept. 75, Detroit, Mich.

YOUR classified ad can be placed in 1,200,000 small town homes at low cost every week. Ask for free Result Checking Book. Use letterhead. Classified Dept., Boyce's Weeklies, 500 Dearborn Ave., Chicago, Ill.

I HAVE practical ideas for non-winding spring motor without weights which will operate large or small machinery. Want partner with money to promote and manufacture same. D. E. Robinson, 103 North 7th Ave., North Yakima, Wash.

BIG Profits: Open a dyeing and cleaning establishment, little capital needed. We teach by mail. Write for booklet. Ben-Vonde System, Dept. C, Charlotte, N. C.

INVEST two dimes for "My Experience in the Mail Order Business." It will save you dollars by preventing mistakes. Don't take chances. Profit by my experience. Eugene Lee, Bellevue, Washington.

PAYS itself monthly; salesmen earn \$48; state managers earn \$36; we get \$36; \$750 capital required. Damon Co., Bowling Green, Ky.

LET me start you in a brand new profitable home business. Utilizing new discoveries. Experience unnecessary; spare time; both sexes. Baur 212a West 114th, New York.

GUARANTEED Remington typewriter free with \$1 monthly. Typewriting Course, Merit Service, Oshkosh, Wis.

PATENTS wanted to sell. Mine made a Fortune, particulars free, send description of yours. Eugene Pearl, M23, Union Sq., New York.

\$1 STARTS paying mail order business at home. Particulars free. Box 115, Brooklyn, N. Y.

FIVE Hundred Things Worth Knowing. Stamp for particulars. Paul Zurflich, Modesto, Calif.

EARN Money at home. Particulars for stamp. Palmer, 2448 Cortland St., Chicago.

BE our representative. Big money making opportunity. Particulars free. Schiller Mfg. Co., 1124A Foster Ave., Chicago.

AGENTS WANTED

EARN \$15 to \$25 a week or more as our Mail Order Dealer Right from your own home. Hold your position until entire time is required. We are manufacturers and owners of patented just-in-season specialties. If you are just starting a Mail Order Business or if already established, you can't afford not to handle our Patented Money-Making Getters. We sell exclusively to our Mail Order Dealers. We protect them. We carry stock and furnish everything. No canvassing. Small capital. Experience unnecessary. Write today for Latest Patented Leader and Manufacturer's Easy Selling Mail Order (copyrighted) plan backed up by "Whole Truth." Positive Proof and Sworn Statement. J. M. Pease Mfg. Co., 539 Pease Bldg., Main St., Buffalo, N. Y.

SPECIAL Sales Manager wanted in your town right away. Plenty of money for you to spend. Hottest tailoring offer ever made. Orders turned over to you. Make \$50 a week at the start. Only part of your time. Your hobby free suit will attract so much attention that orders will simply roll in. Every order means dollars to you. Other good features. Paragon suits sell like wildfire. We prepay all express charges, too. Now is the time to get in. Be the first in your town to get this great offer. An opportunity to make the biggest success ever. Send post card with your name and address for our book of beautiful samples and full particulars. All free, so write at once. Paragon Tailoring Co., Dept. 1191, Chicago, Ill.

ANYONE can make big money easy selling the Aladdin Kerosene Mantle Lamp. No experience necessary. A demonstration sells a lamp in nine out of ten homes. One agent sold over 1,000 on money-back guarantee, not one returned. Another made over \$300 in 15 days. Hundreds doing as well. Evenings may be made profitable. Special introductory offer to the first man in each neighborhood who writes for agency proposition. Mantle Lamp Co., 351 Aladdin Bldg., Chicago, Ill.

YOUNG man, would you accept and wear a fine tailor made suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use \$5 a day for a little spare time? Perhaps we can offer you a steady job. Write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 962, Chicago.

AGENTS—\$50 weekly; we manufacture the best needle case made, a wonderful seller; 200 to 500 per cent profit; talking unnecessary; our copyrighted "Trust Scheme" Envelopes do the work; general agents can make over \$100 weekly; send 19c for a 25c sample containing 115 needles; particulars free; buy direct from the factory at wholesale. Paty Needle Co., 102 Union Sq., Somerville, Mass.

AGENTS—County and State; men and women everywhere to sell the Pinless Clothes Line; a practical labor saving invention, lasts life-time, sells on sight, gives perfect satisfaction. Agent Sutton of Georgia, sold over million feet; 100% profit; write quick for exclusive territory; information free; sample prepaid 25c stamps. Pinless Clothes Line Company, 520 Wilcox Bldg., Portland, Oregon.

WE have recently patented three fast selling inventions and want agents everywhere. Will simply say that these goods are of real worth and sell at popular prices. It will pay you to investigate this immediately. Winfield H. Moody Mfg. Co., 3075 Easton Ave., St. Louis, Mo.

WITH a large force of hustling agents always at work, we are in the market for all kinds of Agents and Mail Order supplies. Send samples, and state best terms. Woodard & Osborne, Camden, New York.

\$10 A DAY for Agents, Selling the New 1912 Fall Style Silk Neckties and giving free with each purchase a beautiful Monogram Roman Gold Finish Cuff Link and Stick Pin Set. Samples free. Dayton Neckwear Co., Room 25, Dayton, Ohio.

MILK Tester "Inspector" shows at once if milk is pure or watered. Utmost practical household article at present. Just run. Sells at sight. Retail 50c. 100% profit. Specialties Co., 672 Eagle Ave., New York, N. Y.

BE Independent! Start a mail order business in your own home. We tell you how, and furnish everything needed wholesale. An honorable and profitable business for man or woman. Particulars free. Many make \$3,000 a year. Murphy Mfg. Co., South Norwalk, Conn.

FREE, swell suits to wear—plenty of money to spend as our special manager in your town. Make \$40 a week easy. Suits sell like hot cakes. Your own free suit will get seeds of orders from your friends. Only part of your time. No money nor experience necessary. All orders we take in your section turned over to you. This is a most stupendous opportunity for one man in each town. Get in Quick! We pay express on everything. Send a post card with your name and address for beautiful samples and full particulars, all free. Entirely new plan. Chance of a lifetime. Don't miss it. No obligations. Hurry. Write today. American Woolen Mills Co. Dept. 1191, Chicago, Ill.

MANAGER wanted every city and county handle best paying business known, legitimate, new, exclusive control, no insurance or book canvassing. Address Chas. F. Halstead, 43 West 34th St., New York.

MEDALLIONS sell at sight, 300 per cent to 500 per cent profit. Make up your own goods and be independent. "It's easy." Catalog free. Fred Resag Co., 1205 W. Randolph St., Chicago.

AGENTS wanted to sell sales books of good commissions in every city in the country. Write for samples and commissions. Chicago Sales Book Company, 158 N. Desplaines St., Chicago, Ill.

AGENTS—700 Things a Boy Can Make—Can you beat it? Set of 4 books that sell for only \$1. Everyone is interested. Enough to keep a boy busy until he grows up. Parents want them for their lads. Good liberal commission. Exclusive territory. Write to Popular Mechanics, Book Dept. 318 W. Washington St., Chicago.

PLEASANT home work; no canvassing or collecting to do! Earn \$50 month in your spare time. All our work may be done in any room of the house without even your nearest neighbor knowing you work for us, if you so desire. Write today! Wilbert F. Biye & Co. Dept. 31, Terre Haute, Ind.

AGENTS—Easily earn \$25 to \$40 per week selling Kno-Darn Guaranteed Hosiery direct-from-the-mill proposition; 20% better; costs less; M. Garwood sold \$400 worth in six weeks; send for free sample; no money required. Kno-Darn Hosiery Mills, Desk 15, Dayton, Ohio.

WE are the largest manufacturers of Twisted Wire Brushes in America. Highest grade goods, best service, highest profit. Write for our new catalog. You are sure to win. Fuller Brush Co., 33 Hoadle Place, Hartford, Conn. Western branch Wichita, Kansas.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 406 N. Clark St., Chicago.

AGENTS—Something new—fastest seller and quickest repeater on earth. Permanent profitable business. Good for \$50 to \$75 a week. Write for particulars. American Products Co., 6125 Sycamore St., Cincinnati, Ohio.

AGENTS—We manufacture glass paper Plain glass windows made to look like stained glass; something new; easily applied big money maker; two sample sheets of paper, with catalogue in colors and discount sheet, for 10c. S. H. Parrish & Co., 202 S. Clark St., Chicago.

EVERYBODY'S Using it Now! The Imperial Self-Heating Sad Iron; sells in every home; \$50 per week to hustler. Write I. B. Farmer, 415 W. Magnolia, Fort Worth, Texas.

AGENTS Wanted—Mechanics and shoemakers make over \$100 a month in spare time selling transparent handled novelty knives and razors. Big profits. Sales easily made. Write for terms today. Novelty Cutlery Co., 67 Bar St., Canton, O.

YOU can make \$888 as our general local agent. Household necessity; saves 10 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pitkin, 113 Redd St., New York, N. Y.

500% PROFIT selling our wonderful silver letters for office windows, store fronts and glass signs; resembles finest gold leaf easily applied; samples free. Metallic Letter Co., 406 N. Clark St., Chicago.

AGENTS—New "Colonial" 10 piece Aluminum Set. An unparalleled opportunity. The aluminum trust prices smashed. Fortune for you in next six months with this special. Housekeepers wild over it, don't delay a minute. Dundee Mfg. Co., 46C Chauncy St., Boston, Mass.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time canvassing. I furnish everything and guarantee success. Send for proofs. Voorss, Desh C. R., Omaha, Neb.

AGENTS—What size Silk Hose do you wear? Send no money. Write today. Offer expires 30 days. Agents wanted in every town. Large profits. Beautiful line. Triple-Wear Mills, Dept. D., 112 So. 13th St., Phila., Pa.

A WONDERFULLY profitable business quickly established in your own community during year wear sight selling dress shoes to men and women from our factory to buyers. No risk. Kusion Komfort Shoe Co., Lynn, Mass.

AGENTS—\$2.50 Cutlery Set free with each set. Forest Rose Rogers Silverware. Every woman buys. 80c profit each sale. Sales a day easy. \$7 outfit sent on approval. Wilson Mfg. Co., B202, Lancaster, Ohio.

KEY Checks—\$1.45 per 100—35 styles. (e) dies for stamping names and addresses, key rings, watch fobs, umbrella keys. Get into the business. We show you how to make \$5 per day. Pease, Die Maker, Dept. M, Winchester, N. H.

AGENTS—\$10 daily with specialty no housewife or office employe can resist; stylish bonanza; particulars free. Harrison Specialty Company, 2524 S. 41st St., Chicago, Ill.

AGENTS—Handkerchiefs, dress goods.leton made \$8 one afternoon; Mrs. Bosworth, \$25 in two days. Free samples. Credit. Stamp brings particulars. Free-Press Mfg. Company, 59 Main St., Brookline, N. Y.

AGENTS—Portraits 35c. Frames 15c. Post Pictures 1c. Stereoscopes 25c. Views 30 days' credit. Samples and catalog free. Consolidated Portrait Co., Dept. 106, 1027 W. Adams St., Chicago.

PORTRAIT Agents—Send for free catalog. Portraits, Frames, Medallions, Pillows, Sheet Pictures, etc. Prices, quality considered, lowest of any. Pioneer Portrait Co., 1265 W. 63d St., Chicago.

AGENTS—Our Columbia Folding Handkerchief is the best proposition on the market. Sold in stores. Big profit. Write for forms and other big sellers. S. V. Diamond, 35 West 21st St., N. Y. C.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no initial; send for free instructive booklet, showing plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

\$100 MONTHLY and expenses to trustworthy men and women to travel and distribute samples; big manufacturer. Steady Work, S. Scheffer, Treas., G. W., Chicago.

AGENTS—250% profit. Wonderful literature. Sells like wildfire. Can be carried in pocket. Write at once for free sample. H. Mathews, 1962 Third St., Dayton, Ohio.

AGENTS—Everybody wears Hose. Sell direct consumer; the line that repeats. Credit plan helps you. Exclusive Agency Hustlers. Address D 2 Lehr Mfg. Co., Denver, Colo.

AGENTS to sell to dealers and make 50 per cent on sales; article of merit, attractively displayed. Retails at 10c; send 5c sample. Rawlings, Box 1053, Central Station, St. Louis, Mo.

PORTRAIT Agents—If you want better portraits for less money, try me. I guarantee satisfaction. Twenty years experience. L. T. Kunde, Artist, 53 Cawker Building, Milwaukee, Wis.

AGENTS—Write it! Enclose stamp. Brief and Fishing trips. MSS returned or check. The Avalon Book-Exchange, Avalon, Ill.

AGENTS—Something live—something fresh—something new. Something that's a seller, and bringing our boys \$35 a week and up. National Manufacturing Co., Mont, Ill.

EXCEPTIONAL opportunity for agents with limited capital to sell private trade stores, celebrated C. R. L. cigars. Sell, 144 Grand St., New York.

AGENTS—Ask us about our snappy household specialty line which will clear \$50 to \$80 weekly. American Aluminum Co., Div. 7, Lemont, Ill.

AGENTS—\$5 daily selling our Handy Tool. 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

I WANT salesmen to sell an advertising novelty of merit. Side line or exclusive. Sample free. Desk 1, Andrew Paysen, Clinton, Iowa.

AGENTS make \$30 week by selling our 500 handy household articles; catalogue free. Scheff Co., Desplaines, Illinois.

EVERY woman will buy Powdered Roach Poison. Sample 10c, formula 25c. Manufacture 25c size, cost 4c. Selvidge Supply Co., Ritta, Fla.

AGENTS—Do you want to make big money? Then write today for our plan and be independent. Benjamin Ray & Co., Box 479, Lumpkin, Ga.

REMNANT Store, 1331 E. Linn, Cincinnati. Greatest Dry Goods Bargains on Earth. Proposition to agents and storekeepers.

AGENTS wanted to sell household specialties—\$6 to \$10 daily. Send for catalog and sample. Harrison Specialty Co., P. O. Box 1603, Pittsburgh, Pa.

DON'T fail to read Independence and Fortune under Business Opportunities.

WANT three swell made-to-measure shirts? Show our samples to friends, take a few orders easy and make enough profit to get yours free. New fancy patterns, made just as you want them. One good agent wanted in each town, spare time or all time. Write for beautiful samples, wholesale and retail prices and our liberal offer. Peerless Shirt Makers, Dept. 1, Chicago.

CHANDLER Clothes Dryer—Pulls up to ceiling on porch or in house. Clothes out of way. Holds good size washing or ironing; weighs three pounds; sent prepaid, \$1.50. Every home will buy one. Agents wanted—Auburn Supply Co., Dept. DD, 7746 Peoria St., Chicago.

AGENTS—Start independent business. My combined pressure cooker and double boiler is so simple that it can be combined out of the utensils in any kitchen. You can either manufacture it yourself, and make a large profit, or you can sell the plans direct to your customers. Full description, with selling plans, \$5. Claude Melnotte, Box 166, College View, Nebr.

SALESMEN: Our Press Button Automatic Opener Pocket Knife, the very newest out. Our sales card sells them quickly for the dealer at a good profit. Fine side line; 80c brings sample knife and card. Knife guaranteed, is worth \$1.50; money back if not satisfied; act quick. Unique Novelty Co., Independence, Iowa.

MAKE \$30 to \$60 weekly selling our new 300 Candle Power Gasoline Table and Hanging Lamp. For homes, stores, halls, churches. No wick, no chimney; 1c per night. Big profits. Exclusive territory. We prepay freight. Sunshine Safety Lamp Co., 938 Factory Bldg., Kansas City, Mo.

AGENTS on salary or commission. The greatest agent's seller ever produced; every user of pen and ink buys it on sight; 200 to 500 per cent profit; one agent's sales amounted to \$620 in six days; another \$32 in two hours. Monroe Mfg. Co., N. C. La Crosse, Wis.

THE money is yours if you grab this winner. It sells to everybody. No talking necessary. Just show it and the sale is made. 100% profit. The wise agent will send for free particulars. Norton Supply Co., R. D. No. 35, Box 10, Dept. 2, Barberton, Ohio.

WHERE did your money go? Find out. Begin the New Year with our Daily Expense Record. It will keep you posted and reduce expenses. A very interesting and complete book—50c. Agents wanted. Auburn Supply Co., Dept. HH, 7746 Peoria St., Chicago.

AGENTS \$5 to \$10 a day easily made selling Bixby's Best Silver Cleaner for cleaning all metals without rubbing. It will sell on sight. If you are a hustler and mean business, send for a sample and terms to agents. Curiosity seekers stay out. Edw. G. McLacklan, 134 Pollock St., New Bern, N. C.

WANTED—Agent to act as Manager in each county. \$150 month easily made. No canvassing. No experience. Success guaranteed. Big expensive samples, instructions, plans and starter, all 10c postage. Dept. 44, Myers & Co., Cambridge, O.

BE Independent. Make \$50 weekly with a New Invention, just patented. 8c profit on every dime. Small investment. Experience unnecessary. Circulars mailed free. International Metal & Ferrotype Company, Dept. B17, Chicago, Ill.

AGENTS—Ladies or gentlemen, to sell the highest grade toilet goods, flavoring, etc., direct to families. High class house; fair dealing; repeat orders sure; large cash commissions. Address Kingham Bros., Indianapolis, Ind.

DID you ever hear of anyone selling Popular 25c Sheet Music at 5c? You can do it, and make 300 per cent. Four sample copies and proposition, 10c. Chicago Book & Music Co., 535 S. Wabash Ave., Chicago.

DO you want to make big money? Resilver mirrors and you'll have plenty. Full instructions for 15-2c stamps. Profitable Service Bureau, 4333 N. Sawyer Ave., Chicago.

AGENTS—\$200 monthly distributing Newells needle cases. Sell 115 needles in book for 10c and make 200% profit. Approval Plan envelopes make talking unnecessary. Crew Managers write. Send 10c for sample book and particulars. Newell Company, 5600 Delmar, St. Louis, Mo.

AGENTS make \$15 per day easy. 150% profit. Our cleaning, polishing, and dustless mop has everything beat. With our goods you can sell every home. Duncan Bros., 2931 N. Troy St., Chicago.

HOT Seller. Over 100% profit. House door guard. Every housewife wants one or more on sight. \$1 a dozen. \$10 gross. Sample postpaid, 20c. Allen Door Guard, 215 Loomis Street, Chicago.

GULFORD Kerosene Mantle Lamps are replacing ordinary lamps like lamps replaced candles. Our live agents will average \$50 weekly all winter. Guilford Co., Seville, Ohio.

SUBSTITUTE for Eggs—Big money supplying Bakeries, Restaurants, Groceries, etc. Formula (guaranteed) with instructions sent prepaid for \$1. W. C. Delzell, 448 South Mathews, Los Angeles, California.

FORTABLE Shower Bath Apparatus. Gives fifteen minutes bath, bathe in any room. Price, \$6 with heater. \$3 allowed off this price for distributing twelve catalogues. Electric Bath Co., Findlay, Ohio.

400% PROFIT selling Gordon Photo Pillow Top. High grade work. Samples and catalogue free. Luther Gordon Co., Northwestern Bldg., Chicago.

EXCLUSIVE representatives to handle "Dahl-Mo-Stat Heat Regulator." Write for circular and discount. Dahl Manufacturing & Sales Company, 324 Fifth Ave. S., Minneapolis, Minn.

HUSTLING Agents Wanted for our fast selling Sanitary Household Brushes. Steady work. Big profits. Postal brings particulars. Dept. C, Hale & Kavanek, New Britain, Conn.

AGENTS—Sell our high grade line of perfumes, toilet articles, soaps and combination sets; 150% profit. We are manufacturers. Hopfinger and Roth, St. Louis, Missouri.

SIGN Letter Agents—Defy competition handling our flexible letters. 5 different styles. All quality. Guaranteed non-tarnishable. 4" letters, 90c per 100. H. Alexander, Manufacturer, 328 East 59th St., New York. Established 1905.

AGENTS—\$20-\$40 weekly, selling Hosiery, Underwear, Sweaters. Samples free to hustlers. Large line. Liberal commission. References required. Sales Manager, Room 42, 54-62 Worth St., New York.

REPRESENTATIVE wanted in every city and town—whole or part time—to handle best paying business known. Legitimate—new—exclusive control—no canvassing. Address Drawer 165D, New Haven, Conn.

AGENTS Mail Dealers. Most practical winning quarter specialty invented. Necessity everywhere. Twenty other money-makers. Cover new field. Columbia Mfg. Co., 1557 Wells St., Chicago.

RESILVER mirrors and make plenty of money. Full instructions, 25 cents. Auburn Supply Co., Dept. CC, 7746 Peoria St., Chicago.

(CELLULOSIA) Door Plates, new, lettering pure gold. Send for sample case. Nothing invested, 100% profit, sell to every house. Public demand them. La Fontaine, Inventor and Mfr., Sherburne, N. Y.

AGENTS, best selling, very rare and newest Japanese novelties that we have ever seen. Catalog free, sample 25c. Otuka Co., 1120 Georgia St., Los Angeles, California.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R. Cincinnati, Ohio.

CASH for names, addresses, information, etc. Steady income at home. Instructive booklet for stamp. Information System, 284 Marietta, Ohio.

AGENTS Wanted—Lucrative and suitable proposition for men or women. Two big ideas in one small package. For particulars—Address, Y. Q. Caldwell, Paris, Tennessee.

SMALLEST Alarm Clock, bible and telescope, 10c each prepaid. W. H. Garner, A-119 South Lafayette St., Evansville, Ind.

AGENTS—For Pocket Fraction Computer. Every office desk needs one; sample, 50c. Erickson Specialty Co., Blackduck, Minnesota.

SALESMEN wanted, no experience required; new, snappy proposition. Good for office and home. Good commission. Write us, R. H. Randolph Co., Dept. 54, Berlin, Pa.

SALESMAN wanted for live wire proposition; 100% profit, \$15 to \$25 per day, sells at sight; particulars free. M. L. Flack, Rankin, Okla.

OUR agents are making big money selling automobile necessity. Write for particulars. Midland Trading Company, Bloomfield, N. J.

I MAKE \$3.50 a day at home, spare time, working my new, easy plans, so can you; particulars for stamp. John Menihan, 218 S. Fourth St., St. Louis, Mo.

HUSTLING agents, either Sex, sell Uo-line Polishing Cloths; every demonstration sells; big profits. Glenside Galenical Co., Glenside, Pa. Box 40.

WINNER—Well I guess. Let me tell you all about it. You can make big money selling this article. Send now for free particulars. John Beer, Dept. A, Sunman, Indiana.

AGENTS—Mail Order Men. Your 25 word ad in 100 Magazines, \$1. Box 22, Station B, Worcester, Mass. The Williams Specialty Co.

AGENTS get the new, unequaled dollar seller. The Universal Shoe Cleaner Mfg. Co., Enterprise, Kansas.

BIG money selling indestructible pens. Outwear all others. Package, 10c. P. M. Miles Co., Lynn, Mass.

AGENTS 400% profit. Send 25c for 5. Sell for \$1.25. Particulars free. Direco, Box 51, East Bangor, Pa.

NEW proposition; quick sale; no limit to orders you get. Sample sent. Mention Popular Mechanics. A. L. Gibson, Nevada, Ohio.

AGENTS—Kimo—Great seller, free sample. Write H. Van Dine, Department M, 152 William Street, N. Y.

AGENTS—Make money selling Ives Razor Paste. Box 25c. Write Lem Ives, Anderson, Mo.

GIRLS—Earn Money. Write today for our steady income offer. The Purezo Co., Urbana, Ill.

AGENTS wanted, big money. Francis J. Mathlez, 393 Herkimer St., Brooklyn, New York.

HAVE you a few hours to spare? We want man or woman in each town. No capital needed. An hour's work shows dollars earned in spare time. Pocket sample, 400% profit. G. C. Mfg. Co. (Dept. L.) 20 Warren St., N. Y.

SALESMEN—Send your name and address to Raymond E. Wood, 114 Dreyer Bldg., Cincinnati, Ohio. I am the manufacturer's Sales Manager for the best household and office electric specialty ever invented. Sells for \$3.50 and \$2.50. Guarantee for credit or deposit required. Capable men only need apply. I want only a few men. The work is permanent, profitable and high-grade. You will be given territory and expected to produce business.

AGENTS! 1000% profit selling our beautiful religious Masterpiece "Christ at Golgotha." Size 14x28 inches, beautiful colors. Sells like wildfire for 25c. Your cost \$2.50 per hundred. Sample 10c. Merchants Specialty House, 521 Dearborn St., Chicago.

MAKE \$10 daily restoring colors to faded rugs and carpets. Spare time, tremendous opportunity everywhere. Simple; easy. Mirror silvering course free. Free particulars, Cox, Dept. MC, Omaha, Neb.

AGENTS. Wild with excitement! Do you blame them? Of course you don't. Everybody eager to buy our beautiful artistic air brush show cards, printed in colors, 11x14, 350 varieties. No talking—simply show the show cards to merchants—the cards speak for themselves. Big profits, something new under the sun. Tide just setting in. The show cards are great—you'll say so—you can't help it. Wake right up, no time to argue. Do it now—send this very minute a letter or postal for free two color catalog. Popular Show Card Co., Dept. JA 1235 Michigan Ave., Chicago, Ill.

AGENTS—Would you like a steady position at \$30 a week to start and a chance to be promoted to district manager at \$3,000 yearly? No experience required. My agents have steady work all the year. I need more agents quick. This fine position is open to you if you will write me personally at once. E. M. Davis, President, Davis Co., 264 Davis Bldg., Chicago.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for \$3.50 and saves the purchaser an investment of \$25. Write for particulars. The Handy Light Co., 12 Handy Light Block, Cincinnati, Ohio.

\$1,000 EARNED by three people within thirty days selling our Fire Extinguishers. Buyers everywhere; protected territory; 500% profit. Local and State Agents wanted. United Manufacturing Company, 1242 Jefferson, Toledo, Ohio.

AGENTS—100% profit—sell to saloons—machine a whirlwind seller. Free sample and salesmanship course. Two sales a day \$15 profit. Write. Simplex Mfg. Co., Dept. 7, Kewanee, Ill.

STOP canvassing! \$10 to \$20 a day without canvassing. Most stupendous merchandising plan ever conceived. Write quick. Ziebart, 3232 Rhodes Ave., Chicago, Ill.

AGENTS—Live hustling men to canvass the homes and offices, selling my new electric device. Cuts electric bills in half. A demonstration sells it. Repeat order getter. You can make big money without previous experience. Complete outfit and selling instructions \$5.45 and I guarantee money back if not satisfactory. Exclusive territory is going fast. Write me today for my proposition. Stanley B. Freiberg, 126 Station F, Cincinnati, Ohio.

REPRESENTATIVES everywhere to sell the Fastest, Simplest and Most Wonderful Calculator on earth. Calculations in whole numbers or fractions are instantaneous. Entirely new idea. Easily understood. Will revolutionize all present methods. Sells for \$5.00. Write today Instantaneous Calculator Company, Detroit.

AGENTS—No experience required, earn \$20 to \$40 weekly, selling household specialties, write for particulars. Charles J. Haines Co., 1505 Linden Ave., Baltimore, Md.

SPHINK Ink—safety ink, shows tampering. Nongumming, noncorrosive; sells from pocket, 200% profit, best side line. Proposition free. Bayless Sons Company, Muncie, Indiana.

AGENTS—Salesmen. Seasonable seller, latest \$3.50 electric invention fills demand never before supplied; home, office, store, everywhere eagerly sought. Repeat orders outnumber first sales, you control territory, no competition, unlimited possibilities. Write Frank W. Allen, Agency Manager, 138 Station F, Cincinnati, Ohio.

FORMULAS—3,000 Formulas and Digest Publishing 100 formulas, etc., monthly. One year 50c or Silvering Formulas and Digest, one year 25c—or 200 Formulas and Digest one year, 25c. Digest, Grand Rapids, Mich.

AGENTS—No less than \$888 per day; new article; whirlwind seller. Free sample. Write today for particulars. Lindsay Mfg. Co., Box 1573, Lindsay, Cal.

GENERAL Agents—Capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business to sell the newest electric specialty on the market; sold everywhere there is electricity in the home, office, factory, store, hotel, liberal profits; sales-driving sample, weighs a pound; no experience or knowledge of electricity required; shows how to use one light instead of two and get the same results; sells for \$2.50, \$3.50, \$5.00 and saves the purchaser an investment of \$25.00. Write for particulars. The Handy Light Co., 150 Handy Light Block, Cincinnati, Ohio.

EARN \$100 a week at home; One man made \$185 in 15 days with \$5 capital. Write for free circular describing all. F. Smith Sales Co., Box B472, Waterloo, Iowa.

AGENTS in every town, best selling household articles. Start at once. Large demand for goods. \$25.00 to \$50.00 a week. Success assured. Investigate today. Mail Specialty Co., Dept. H, Williamsport, Pa.

THINK of the number of flue holes in America. Every one needs the new patented Pipe and Collar Support. Agent wanted. J. H. Allen, 1290 Magoffin Ave., El Paso, Tex.

WANTED—Agents. An automobile necessity. Sells easily and quickly. Big profit on each sale. For particulars, write Oakland Merchandising Co., H., 109 Oakland Ave., Pontiac, Mich.

AGENTS wanted to handle quickest selling household specialty on market; 100% profit. Sells itself. Every sale brings repeat orders. Write today. Agents Supply Co., Box 1071, Pasadena, Cal.

AGENTS wanted for Oriental novelties never before seen in America. Quick seller. Repeaters. Immense profits. Sha Kanematz, Box 529, Portland, Oregon.

1500% PROFIT selling our Gold Sig Letters. We'll show you how. Sample free. Johnston Co., Quincy, Ill.

PHENOMENAL Success awaits salesman with our sales-driving specialties. Emporium Co., Minneapolis, Minn.

READ the Agents Magazine. 2 month 10c. Yearly 50c. Agents Magazine, Chicago.

FOR money making propositions write P. Newnham, Waukegan, Ill.

YOU can make more money operating Mail Order business but before taking chances invest 10c for two samples "Booster"—the one bona fide Mail Order and Agents' publication on earth—a magazine that has made money for others and will show you how! Send 10c today—1 worth dollars to you. Booster Magazine Northwestern Building, Chicago.

SIGN Agents—Painters—Something new and better. Attracto ready-made Gold and Silver letters. 21 kinds, easily applied. Make big money lettering store window making signs, and selling our line of flashing, sparkling chipped glass name-plate. No experience needed. Write for sample letter and catalogue and start at once. Address Attracto Sign Co., 2655 North Cla Street, Chicago, or 519 Pacific Bldg., San Francisco.

AGENTS—\$60 weekly; we make the best "Self-Sharpening Shears" on the market something new and different, cannot dull or work loose due to our patent tension spring. No selling experience needed. Our original selling plan gets the order every woman buys on sight. Particulars free. 7c sample "Self-sharpening Shears" free. Satisfaction guaranteed or 25c refunded. J. R. Hoag, Mount Airy, Pa.

\$61.50 WEEKLY. Introducing and Selling a New Gas Light Burner for Kerosene Lamps. Beautiful light. No chimney. No mantle. Perfectly safe. Simple in construction. Nothing to get broken or out of order. Will not burn out. Durable. We last for years. Low price. Easy to sell. 200 per cent profit. Experience not necessary. Samples free. Why not try one your lamp? Beware of imitations. Branch offices. Luther Manufacturing Co. Dept. 163, Cincinnati, Ohio.

ARE You Receiving Double profit your Winter's Work? Control of low Thermozone sales will bring this to you. Small cash capital needed. Exclusive right for this universal product if you qualify. Write Victory Company, 208 Pearl St. Buffalo, N. Y.

MANUFACTURER of popular brand linens and too guaranteed hosiery was agents to sell direct to consumers. Ped man earned \$136.20 in five days. Exclusive territory. Credit. Send for particulars. N. Parker Mills, 720 Chestnut St., Phila., Pa.

BEAUTIFUL Embossed Gold Wind Letters make 1000% profit without expense. New easy proposition. Signs always needed. Ours last for years. Rock bottom prices. Essentials to work with mail free. Embossed Letter Co., 235 W. 110th St., Chicago.

AGENTS. One cent invested in a postcard will bring you a \$35.00 to \$60.00 week proposition. Sterling Aluminum Co. Canal Station, Chicago, Ill.

AGENTS To sell our Vacuum Cleaner, carpet sweeper type, three year guarantee, write Manufacturer, 1419 Main St., Kansas City, Mo.

"AGENTS Wanted" advertisers are most successful and enthusiastic users of advertising space in Boyce's Weeklies. The 2,000,000 circulation pays big. Write for free Result Checking Book. Use letterhead. 60 Dearborn Ave., Chicago, Ill.

CANVAASERS, either sex. Send for factory price. Kitchen necessity, patented. Mary E. French, Clyde, Ohio.

AGENTS—Either sex, handle three articles housewives use weekly. Free trial samples, get the business. All year re-peaters. Permanent income. Attractive proposition and samples for 6c postage. Leibman Mfg. Co., Richmond Hill, New York City.

AGENTS Wanted everywhere to handle our specialty, big demand, easy seller, no canvassing; write for particulars. C. G. Randall Co., New London, Conn.

PECANS as an investment pay better than Life Insurance. Stock for sale. Agents wanted. 5% guaranteed while grove is being developed. Capital \$200,000. Georgia State Pecan Co., Box 513, Valdosta, Ga.

AGENTS. Cost 2c, sell 25c. Sign letters put on with roller. Samples free. Embossed Letter Co., 230 West Illinois St., Chicago.

SHAVEZY Guard makes Safety Razor of our own favorite blade. Excellent line for shopmen everywhere. Sample 25c. Particulars, red stamp. Keon Mfg. Co., Waltham, Mass.

BOKARA Diamonds—Agents, everyone, to wear and sell our famous Bokara Diamonds. Write for sample offer and catalogue free. Northwestern Jewelry Co., 52 Northwestern Bldg., Chicago.

GERMAN Silver Key Tags, Stamped with our name and address. A 25c sample postpaid, 15c. Agents wanted. 100%. Randall Novelty Co., Nashua, N. H.

WE Pay \$80 A Month Salary and furnish rig and all expenses to introduce our guaranteed poultry and stock powders. Address Bigler Company, X368, Springfield, Illinois.

AGENTS—men and women, newest invention. Wing Self Heating Gasoline Flat Iron; guaranteed, sells everywhere. Women delighted. Write for particulars. Wing Mfg. Co., 1608 Fulton St., Chicago.

ONE Million Agents Wanted. Fast sellers costing 2c, selling 25c, in quantities to 50. Every firm needs. Postal brings samples. Embossed Co., 240 West Illinois St., Chicago.

IN every locality—\$50.00 to \$100.00 monthly. For sparetime—Experience unnecessary. Cash benefits when sick, injured, and at death. Write for Cash-bonus offer. Box NT-293, Covington, Ky.

AGENTS—Make \$5 daily handling our up-to-date Door Plates, Name Plates, House Numbers, Signs, etc. Samples free. Brett Bros., Boston, Mass.

AGENTS—Make \$2 each selling our wonderful luminous crucifixes; nothing to sell in a day; absolutely new; shine all night in darkest room. Pioneer Portrait Co., 259 W. 63rd St., Chicago.

PORTRAIT agents find our plan beats all others. Prompt shipments—refunds credited. 30 days' Credit. Catalogue of Portraits, Frames, Pillow Tops, Sheet Pictures and samples free. James C. Bailey & Co., Desk T-1, Chicago.

AGENTS Sell Rich Looking Imported 6x68 rugs \$1 each. Carter, Tenn., sold 15 in four days, his profit \$57. You can do as well. Write for sample offer and selling plan. Condon, Importer, Stonington, Maine.

AGENTS—Callender shoe-scraper pays large profits; Adams sold 5 dozen first 2 days; every housekeeper will buy; guaranteed proposition. Smith Mfg. Co., Mansfield, Ohio.

EVERYBODY needs Rubber Stamps. Make them yourself. Simple instructions. 15 vulcanizer. Circulars free. Stamp Works, Newcastle, Ind.

AGENTS. Be quick—get the agency—never such a seller—make \$100.00 a week—Model Vacuum Cleaner—carpet sweeper type—wonderful suction—Sells for \$8.50—your profit over 100 per cent—no competition—patented—we start you—the Cleaner sells itself—free sample to workers. Model Vacuum Co., D25, Cincinnati, O.

MANUFACTURE fast selling article. Sell yourself or through others. Capital to start \$2. Sample and particulars 10c. Box 449, Cincinnati.

WE want boys to represent us. Splendid premiums given. Magazine and particulars 5c. American Youth, 1124-A Foster Ave., Chicago.

AGENTS. Our Publication tells where to get best propositions. Sample free. Big Mail Directory, 1124-P Foster Ave., Chicago.

BIG money in Essex Fan Motors, run by gas or gasoline. Winfield H. Smith, 10 Lock Street, Buffalo, N. Y.

5,000 LIVE Agents wanted, big profits. Will N. Hoyt, Brockton, Mass.

AGENTS wanted. No trash. Crown Mfg. Co., Cedar Falls, Iowa.

AGENTS make \$30 weekly, fast selling novelty. Fine sample outfit. Particulars Free. Pals Manufacturing Co., 25 East 14th Street, N. Y. City.

SIGN Painting Agents. 1000% profit. Best and cheapest window letters made. Mounted sample free. Success positively guaranteed. Embossed Letter Co., 245 West Illinois St., Chicago.

BE our representative. Big money making opportunity. Particulars free. Schiller Mfg. Co., 1124A Foster Ave., Chicago.

HELP WANTED

"GET Out of the Rut." Make \$15 to \$50 a week during a few hours of spare time at home. Get the big profits in the Mail Order Business. Represent the manufacturer. No canvassing. I want ambitious fellows to handle my "latest" and the increased output of my new factories. I show you my methods are successful, before you start business. Personal coaching, and warehouse privileges free to co-workers. Write now for copyrighted plans, "whole truth," positive proof and sworn statements. J. M. Pease, Gen'l Manager, J. M. Pease Mfg. Company, 576 Pease Bldg., Main St., Buffalo, N. Y.

WANTED one thousand chauffeurs and repair men. Our demand for automobile engineers exceeds the supply. Calls for men of intelligence and mechanical bent capable of commanding \$100 to \$150 per month upon graduation. Resident course \$20 to \$60. Home Correspondence course completed by practical road and shop work at this school, highly successful. Look this up. Auto Schools of America, Dept. T, 1660 Michigan Ave., Chicago.

WANTED—Agents, Machinists. Attention! Increase salary, new revised Saunders' Hand-Book of Practical Mechanics. Best ever ready reference. Thousands in use. Postpaid \$1 cloth; \$1.25, \$1.50 leather flap. Big profits. E. H. Saunders, 216 Purchase St., Boston, Mass.

WANTED—A man or woman, all or spare time, to secure information for us. Work at home or travel. Experience not necessary. Nothing to sell. Good pay. Send stamp for particulars. Address M. S. I. A., 522 I. Building, Indianapolis, Indiana.

INTELLIGENT persons can earn good income at home in spare time copying letters. Fine opportunity, experience unnecessary. Send today addressed, stamped envelope for particulars. Box 17, Station H. G., New York.

THE demand for cartoonists is increasing. Many young men have talent, but not the opportunity of developing it. We can suggest an inexpensive method that will add anyone anxious to take up the study of drawing. Send your name and address to box 223, Glencoe, Ill.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorbles, Desk C. R., Omaha, Neb.

GO on the Stage. Vaudeville career offered you. Experience unnecessary. Managers endorse my method. Instructive vaudeville book free. Write today. Frederic Labelle, Sta. 10, Jackson, Mich.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

WANTED—High class reliable state sales managers for a store fixture without competition. Commissions \$300 to \$500 per month. Address the Buckley Specialty Co., Lima, Ohio.

SALESLADY wanted for Highgrade Corset, not sold in stores. Best corset, best proposition to salesladies. References. Wade Corset Co., Station L, New York.

ANY intelligent person may earn good income corresponding for newspapers. Experience unnecessary. Address Press Correspondence Bureau, Washington, D. C.

DETECTIVES earn from \$100 to \$500 per mo. and expenses. How much are you earning? Write for particulars. Interstate Detective School, McDougal Bldg., Peoria, Illinois.

WE have few openings in each state for Sales Manager to distribute American Flags. P. O. Box 466, Bridgeport, Conn.

DON'T fail to read Independence and Fortune under Business Opportunities.

500 MEN 20 to 40 years old wanted at once in every state for Electric Railway Motormen and Conductors; \$60 to \$100 a month; no experience necessary; fine opportunity; no strike; write immediately for application blank; address Manager, W-10, Dwight Bldg., Kansas City, Mo.

MEN and boys to learn automobile repairing, driving on up-to-date cars; electrically, civil engineering, surveying. Methods most practical. Room and board while learning. Positions secured; satisfaction guaranteed; catalog free. National School of Engineering, 2110 W. 7th, Los Angeles.

BIG Money Writing Songs. Hundreds of dollars have been made by successful writers. We pay 50 per cent of profits if successful. Send us your original Poems, Songs or Melodies today, or write for free particulars. Dugdale Co., Dept. 285, Washington, D. C.

WANTED—First Class Gridley and Brown & Sharpe Automatic Screw Machine Operators, also Hand Screw Machine Operators and Tool Setters. Apply by letter to the Employment Department, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

WANTED—Distributors, men or women to give away free packages our famous Perfumed Borax Soap Powder; no money or experience needed; good pay. Ward & Co., 1775 Berceau Ave., Chicago.

WANTED—First Class Electrical Instrument Makers and Gridley and Brown & Sharpe Automatic Screw Machine Hands. Address Employment Department, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

LOCOMOTIVE. Firemen and Brakemen for all railroads; \$80 to \$100 monthly. Age 18 to 35. Experience unnecessary; no strike. Promotion, Engineer, Conductor. Railroad Employing Headquarters—over 400 men sent to positions monthly. State age; send stamp for application. Railway Association, Dept. 89, 227 Monroe Street, Brooklyn, N. Y.

LINOTYPE instruction; twelve weeks. \$80; unlimited course. \$150; largest school in existence; \$20,000 equipment. Empire School, 419 First Ave., New York.

SALESMEN visiting garages East of Mississippi to fill in part time for us. References exchanged. Waterbury Welding Co., Waterbury, Ct.

WANTED—Instrument Makers, Brown & Sharpe and Gridley Automatic Screw Machine Operators. Address Employment Department, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

CASH for information, names, formulas, and ideas. Steady, profitable home business. Instructive booklet for stamp. Information System, 285, Marietta, Ohio.

WANTED—Distributors of advertising matter everywhere. Your advertisement in Barkley's Magazine, 1c word. American Distributor, Blairsville, Pennsylvania.

GOVERNMENT positions open to men and women. \$90.00 month. Annual vacations. Short hours. No "layoffs." Purely Post means thousands of postal appointments. "Pull" unnecessary. Farmers eligible. Write immediately for free list of positions open. Franklin Institute, Dept. J 21, Rochester, N. Y.

GET away from wage slavery—make more money! Operate a mail order business—our "Silent Salesman" system—can be done in spare time and the possibilities are unlimited. For years "Booster" has actually and accurately led thousands like you over the Successful Road to Wealth—it tells you how to get the dollars—puts you next to the best money making propositions on earth. Send 10c for two months trial subscription. Booster Magazine, Northwestern Building, Chicago.

\$75.00 MONTH paid Railway Mail Clerks. Examinations coming. Preparation free. Franklin Institute, Dept. J 21, Rochester, N. Y.

ANYBODY without work spare time or evenings, I will pay \$12 a week and commission, latest thing out, no fake, send 10c for sample outfit, and start right in selling them. Box 101, Springfield, Mass.

PARCELS Post means thousands Railway Mail Clerks needed. \$75.00 month commence. Examinations announced Jan. 15th. Farmers eligible. Common sense education. Write for free list positions open. Franklin Institute, Dept. J 21, Rochester, N. Y.

WE teach you a trade in few months' time; pay wages after second month. Electricity, automobiles, plumbing, bricklaying, 100 satisfied workmen today; 40 jobs going. Catalog free. United Trade School Contracting Co., Los Angeles.

PARCELS Post means thousands Railway Mail Clerks needed. \$75.00 month commence. Examinations announced Jan. 15th. Write for free list positions open. Franklin Institute, Dept. J 21, Rochester, N. Y.

ANY competent person desiring to better his position can learn something of advantage about different ways of getting positions. Send for particulars. Hilliard Munson, Niagara Falls, N. Y.

RAILWAY Mail Clerks Wanted. \$75.00 month. Thousands Parcels Post appointments. Write immediately. Franklin Institute, Dept. J 21, Rochester, N. Y.

DO You Want to Start a Silver Plating business at home; be independent, your own boss. My descriptive pamphlet shows you how. Write today. Milliken Co., Davenport, Iowa.

PARCELS Post means thousands Railway Mail Clerks needed. \$75.00 month commence. Write for list positions open. Franklin Institute, Dept. J 21, Rochester, N. Y.

MAKE \$10 daily restoring colors to faded rugs and carpets. Spare time. Tremendous opportunity everywhere. Simple; easy. Mirror silvering course free. Free particulars. Coxe, Dept. MC, Omaha, Neb.

9,500 GOVERNMENT Jobs Open. Write for list. Franklin Institute, Dept. J 21, Rochester, N. Y.

MAKE Money At Home reproducing photographs of persons and scenes upon watch-cases, dials, plates, spoons, vases, etc. Knowledge of photography unnecessary. Write today for attractive proposition. Kalos Mfg. Co., 7 Hamilton Place, Boston, Mass.

DON'T let this get by you. I want a live man in your town to make \$1,000.00 to \$3,000.00 per year Extra Money. Write today and you will get a wonderful offer. Earl Pauley, Erie Bank Building, Buffalo, New York.

GOVERNMENT Customs—Internal Revenue. Railway Mail Clerk examinations everywhere soon. Get prepared by former Government Examiner. "Real Courses." Write Now for free booklet. C. Patterson Civil Service School, Rochester, N. Y.

ENTER The Merchant Tailoring Business for yourself. Learn to cut men's clothes by our easy system. Big profits—no investment. Full particulars free. Write today. Success School of Cutting, Dept. 11, Jackson, Mich.

ACTIVE men wanted in each locality. \$50.00 to \$100.00 monthly for sparetime—Experience unnecessary. Sick, injury, death Insurance Protection. Write for Cash-Bonus offer. Box NU-293, Covington, Ky.

WANTED Salesmen—Earn \$250 per month. Sell dealers highly advertised article. Samples not necessary. Elato Co., Station L, New York, N. Y.

IF you want help, tell your wants in 1,200,000 rural homes simultaneously. Use Boyce's Weeklies. Write for free result Checking Book. Use letterhead. Classified Dept., 500 Dearborn Ave., Chicago, Illinois.

GET Your Preparation for United States Civil Service School Examinations from former United States Civil Service Secretary Examiner. "One who knows." Free booklet. Arthur R. Patterson, Rochester, New York.

SALESMEN: To handle our high grade Lubricating Oils, Auto Oils, Greases, Paints, Varnishes and Specialties. Salary or Commission. Central Petroleum Co., Cleveland, Ohio.

YOU can make big money writing letters for us during spare time. We furnish everything. International Mercantile Alliance, 125 Bloomfield Street, Hoboken, N. J.

BE a Detective—Earn \$150-\$300 monthly. Greatest opportunities. Write Frederick Wagner, 1243 Lexington Avenue, N. Y.

WANTED—Young Men who believe they can sell genuine diamonds, exceptional opportunity. Write William H. Mullally, Newark, N. J.

\$\$\$\$\$ for information, names, etc. We sell same for you on commission to our clients. Experience unnecessary. Enclose stamp. National Information Sales Co., ADX, Cincinnati, O.

MACHINERY, TOOLS, SUPPLIES

WE supply set patterns, Cast Iron flasks, Drawings, Machined parts for 7-2 cycle engines 3 1/4 inch bore, 2 hp. for \$1.50 complete. Also sets for 1, 3, 4, 6, 8, 12, 15, 20, 35 hp. 4 cycle, also for small ice machines. Cheap. Engineer, 3015 Walnut St., Milwaukee, Wis.

HOW to quickly start your gasoline engine in zero weather. Make device yourself. Costs but few cents. Guaranteed right. Drawings and instructions, one dollar. Money back if won't work. Send bill in envelope today. Addison Johnston, Box D, Stettler, Alberta.

FOR Sale—Gasoline engines, automobiles, marine and stationary, also castings. Second-hand ones taken in exchange and for sale. Apply with stamps. B. W. Richardson, R. No. 36, Peoria, Ill.

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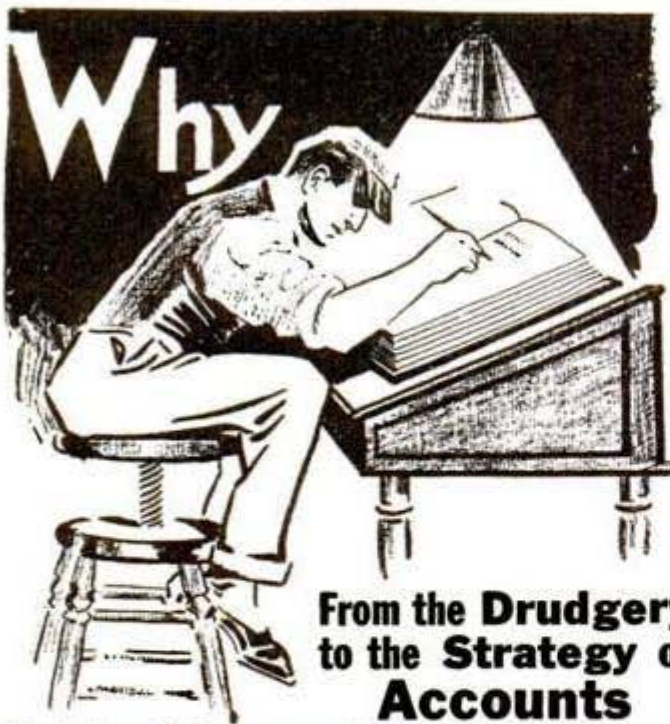
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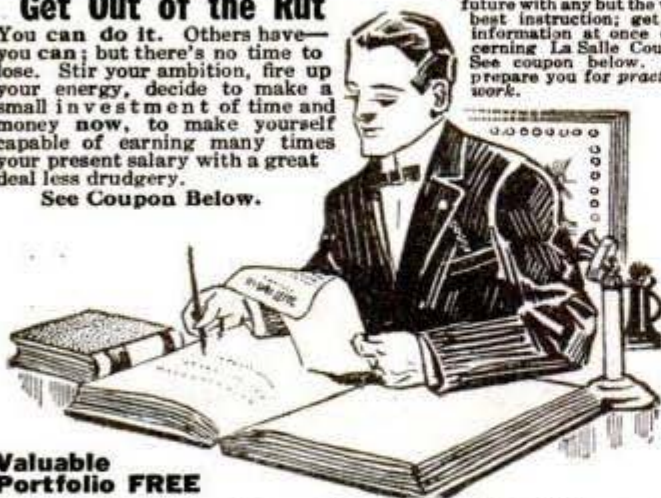
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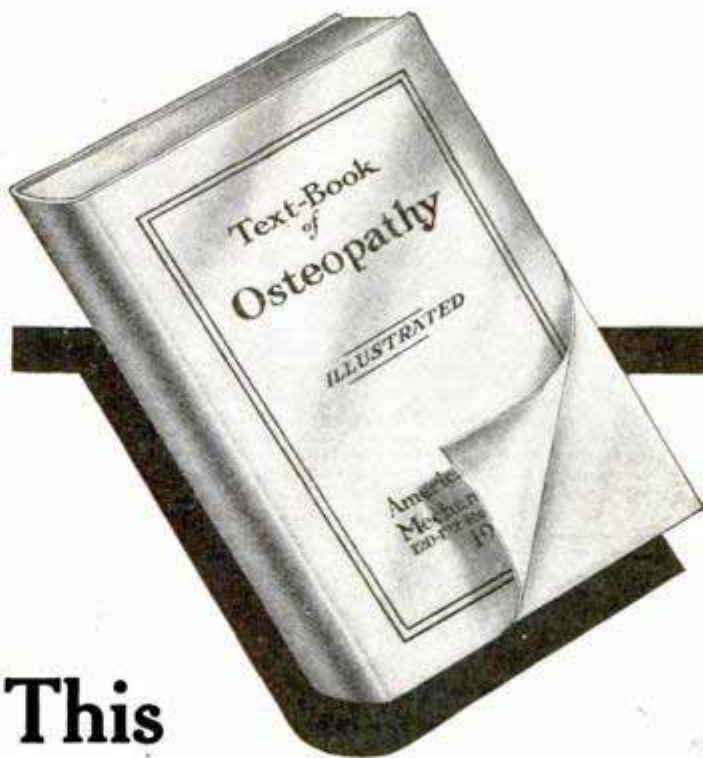
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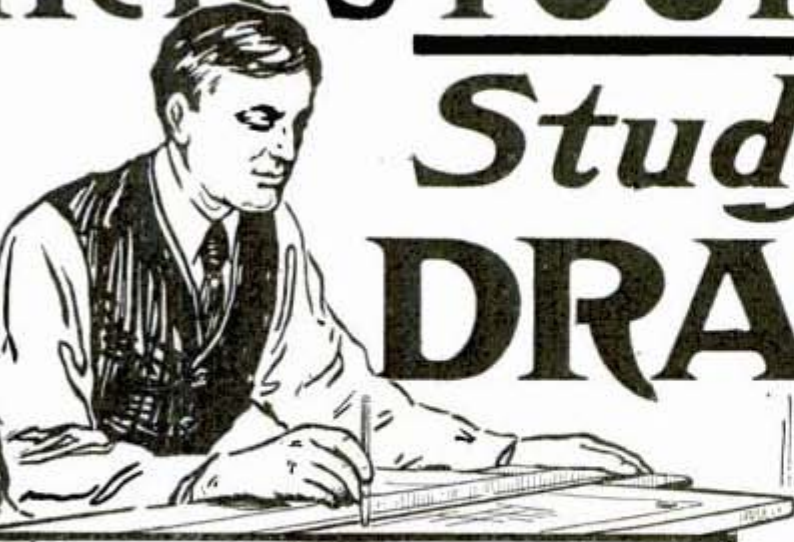
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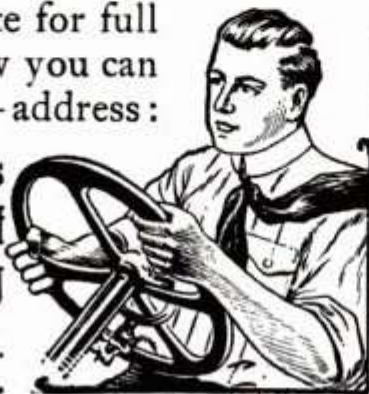
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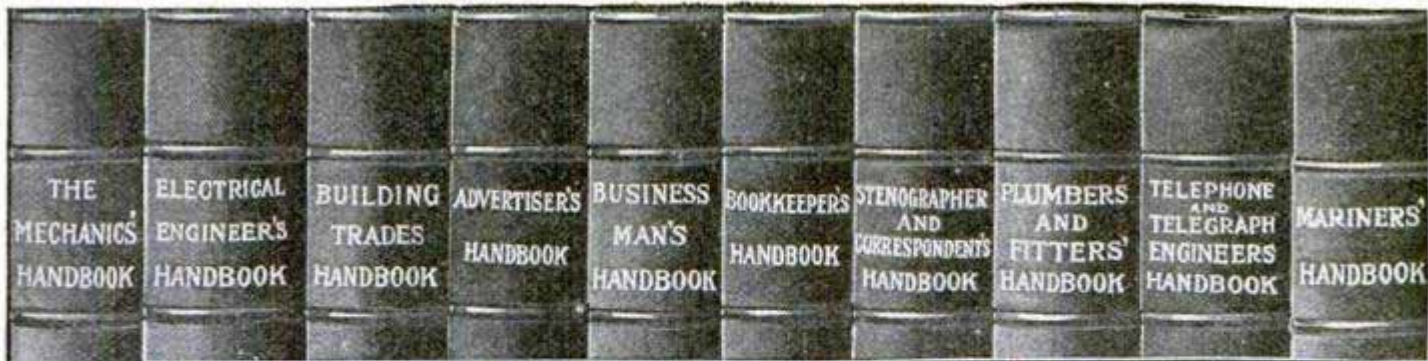
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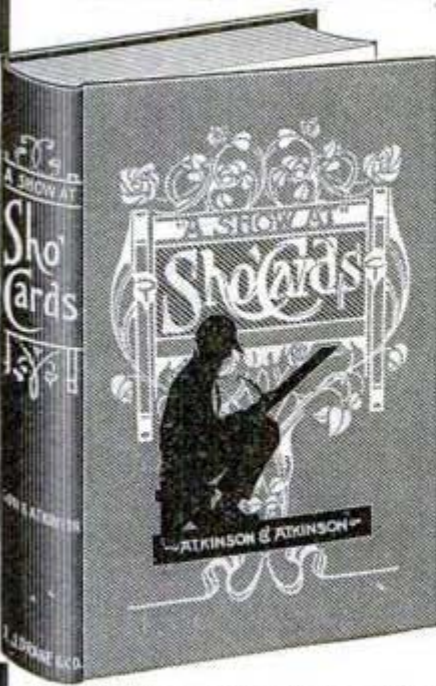
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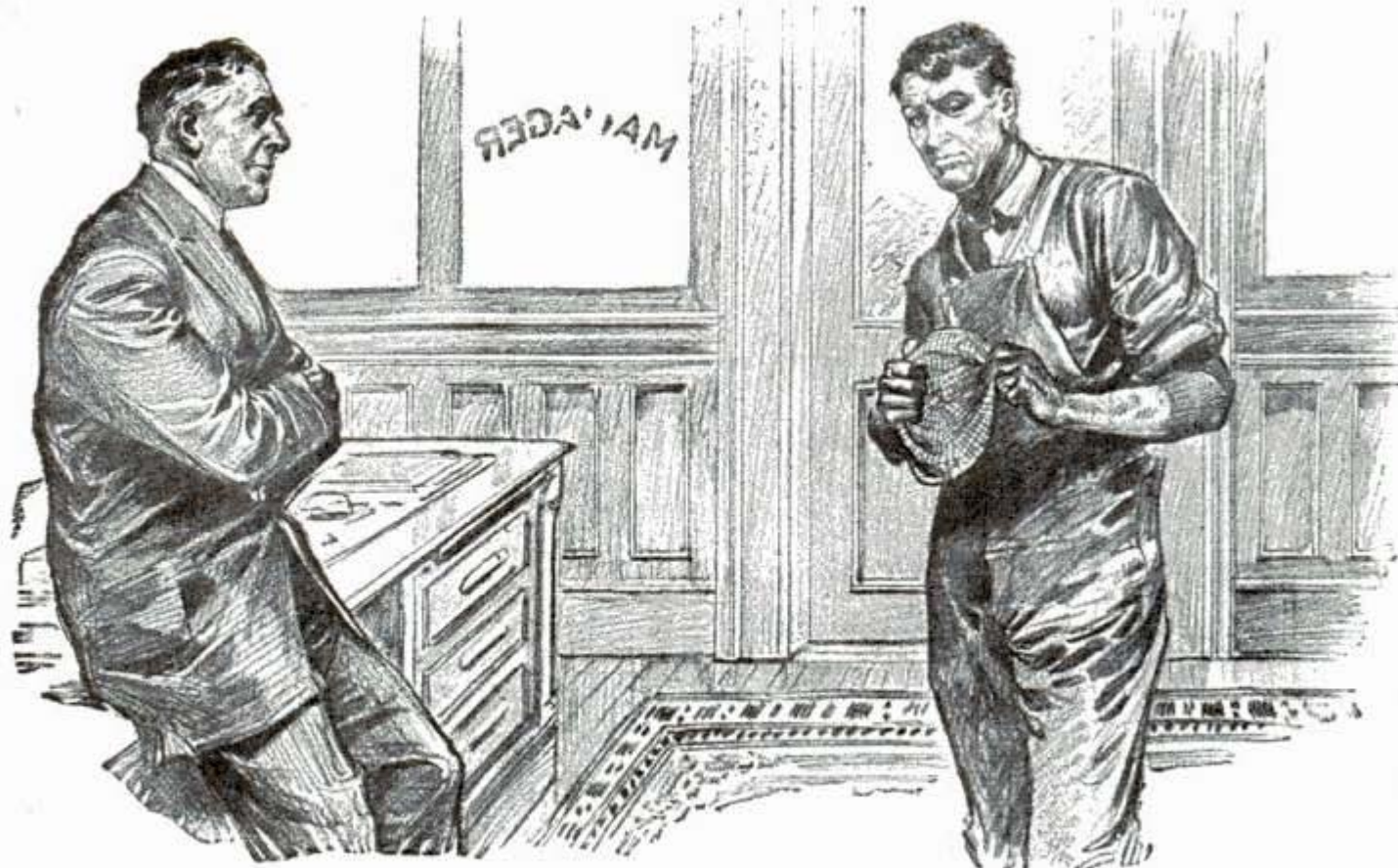
There are XX chapters in all, XIX carrying you from the fundamental principles of electricity on through the various branches to a point where the careful student comprehends the complete designing, care and operation of a dynamo or motor, and one chapter on electric automobiles, outlining their construction, care and operation, and all about storage batteries and how to handle them. Each subject is carefully written and to the point. After a student studies a subject, he is questioned on that subject in such a manner as to bring clearly to his mind the points he needs to know regarding same. The book contains a dictionary defining 1500 Electrical Words, enabling the reader to ascertain the meaning of any electrical word, term or phrase used in this book, as well as hundreds of others in common use. All required tables necessary in the study are in it.

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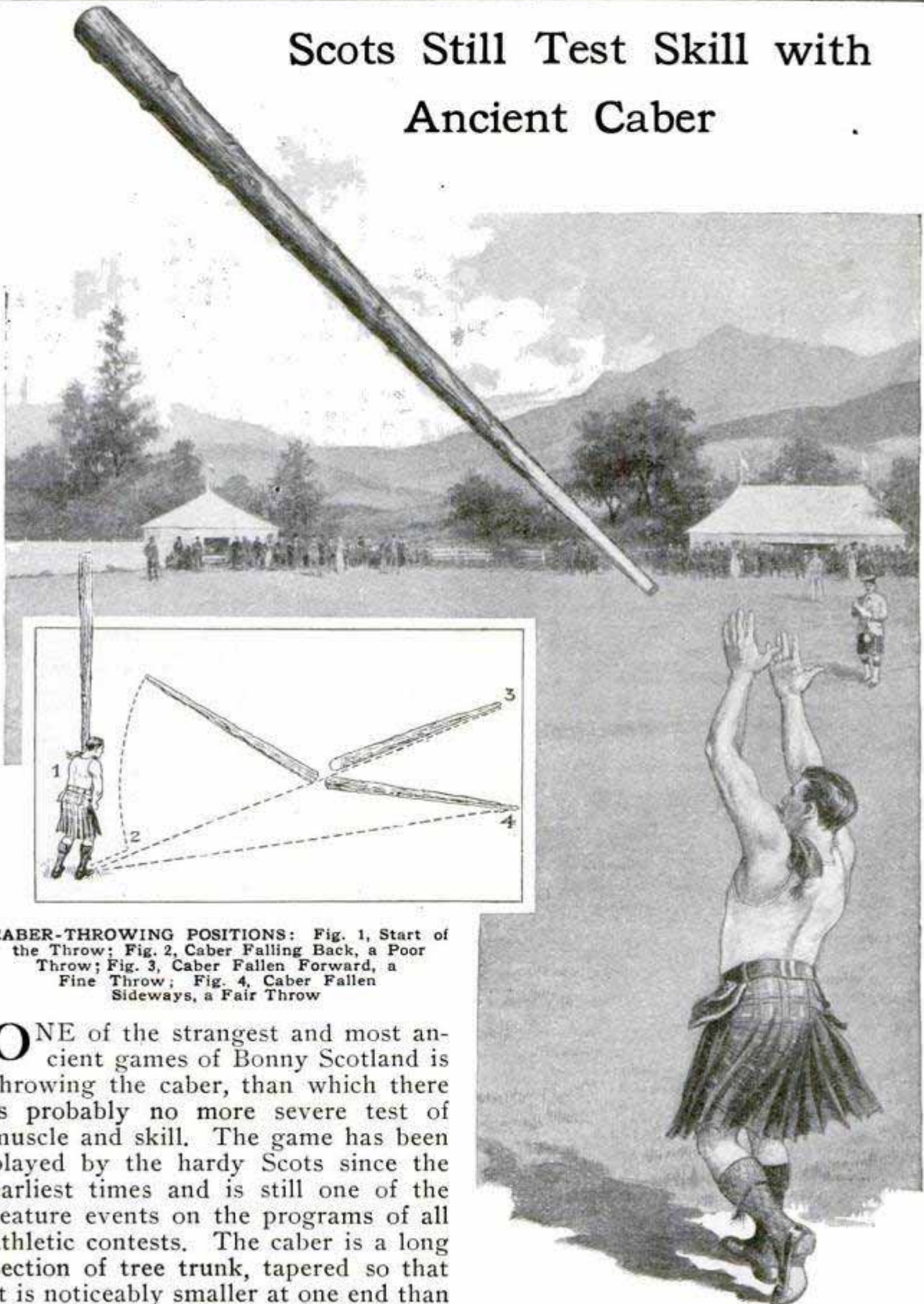
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 19

JANUARY, 1913

No. 1

Scots Still Test Skill with Ancient Caber



CABER-THROWING POSITIONS: Fig. 1, Start of the Throw; Fig. 2, Caber Falling Back, a Poor Throw; Fig. 3, Caber Fallen Forward, a Fine Throw; Fig. 4, Caber Fallen Sideways, a Fair Throw

ONE of the strangest and most ancient games of Bonny Scotland is throwing the caber, than which there is probably no more severe test of muscle and skill. The game has been played by the hardy Scots since the earliest times and is still one of the feature events on the programs of all athletic contests. The caber is a long section of tree trunk, tapered so that it is noticeably smaller at one end than

at the other. The man who essays to test his strength by tossing it raises the pole to a vertical position in his hands, smaller end down, and then throws it into the air and away from him. He must make the large end of the pole hit the ground and the pole fall in such a way that the small end will describe a half circle. The prize goes to the man whose caber, having been thrown in the manner described, lands on the ground with its smaller

end farthest away from the throwing point. Considerable skill is required to make the throw, as well as considerable strength. The caber is likely to fall over sideways instead of straight forward when the large end hits the ground, or it is likely to fall at an angle or even fall back the way it has come. Therefore, everything else being equal, the longest throw is always that which causes the caber to fall straight away from the player.

WHITE-LIGHT INSTALLATION FOR PHOTOGRAPHERS

An installation of the Moore tube to provide artificial daylight in a photographic studio is shown in the accompanying illustration. The tube is coiled into a comparatively small area for a lamp of this kind. When nitrogen gas is used in the tube a yellow light is obtained, but with carbon diox-

ide the light is said to be almost exactly like daylight, not only in color, but also in that it is diffused, the light coming from such a large area as to be almost shadowless. The carbon dioxide is admitted to the tubing from the container by means of an automatic valve, which assures that the gas inside the tube and the electrical conditions will remain constant. The valve is regulated by an electromagnetic solenoid, which responds to any slight variation in the current passing, and feeds, as a rule, about every 10 or 20 seconds.

TROLLEY CAR BENDS IN THE MIDDLE

An experimental street car known as the articulated car has just been put into service on one line in Boston. This car embodies a number of new features making for safety, comfort and convenience of passengers. As the name articulated indicates, the car is jointed, which enables a car of large capacity to be used on tracks having sharp curves without dangerous overhang of cars, and is, therefore, particularly well adapted to meet the conditions in Boston which is famous for its narrow and crooked streets.

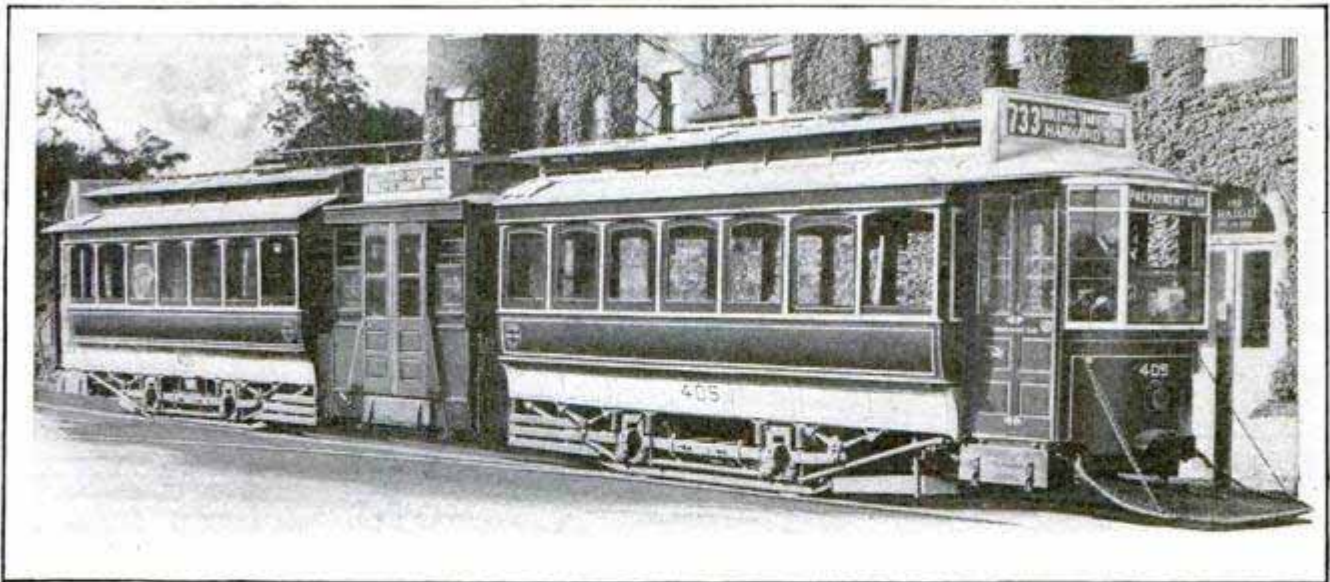
The car has a total length of 63 ft. and can be operated on all lines where short cars are now used without exceeding the overhang clearance of the short cars. Another feature of great importance, as applying to Boston conditions, is the distribution of the weight of the car on the tracks, which enables



Imitation-Daylight Illumination Tubing Installed in Photographic Studio

Ans. McFarlane Moore

Moore Tube 2/15 temporarily withdrawn from market pending a change
 by N.Y. Co. of General Ele.



Articulated Car, for Service on Boston's Winding Streets

it to be safely operated over bridges designed for light cars. It has three compartments, one at each end with the usual vestibule, and a center compartment pivotally connected to the end compartments in such a manner as to provide at all times a safe and easy passage between the compartments.

The trucks are placed under the end compartments, and thus the center compartment can be carried closer to the street which permits a low entrance step. The car, at present, has folding steps at the center-compartment doors, but it is the intention, in future designs, to lower this compartment still more, so that there will be but one step from the street into it. The conductor, being stationed near the central door, is enabled to give passengers entering or leaving a car careful attention at all times, and also has a better opportunity of seeing passengers who desire to leave.



"Magnet Bill" is the Official Preventor of Tire Punctures and Cuts in the Plant of a Toledo Automobile Concern

As the entrance and the exits are closed by doors, passengers cannot enter or leave while the car is in motion, thus eliminating boarding and alighting accidents. The doors and steps of the center compartment are operated by an improved type of pneumatic appliance with just sufficient force to open and close doors properly and smoothly.

Another interesting feature is the arrangement of the roof, which permits the conductor to see the trolley at all times and enables him to replace the trolley on the wire without leaving his position.

708 ———
**"MAGNET BILL," AN
 IMPORTANT UNIT
 OF AN AUTO
 CONCERN**

"Magnet Bill" doesn't look like a very important part of the big automobile plant in which he is employed in Toledo, Ohio, but he may be seen, summer or winter, rain or shine, walking slowly about the plant with eyes

Willys-Overland

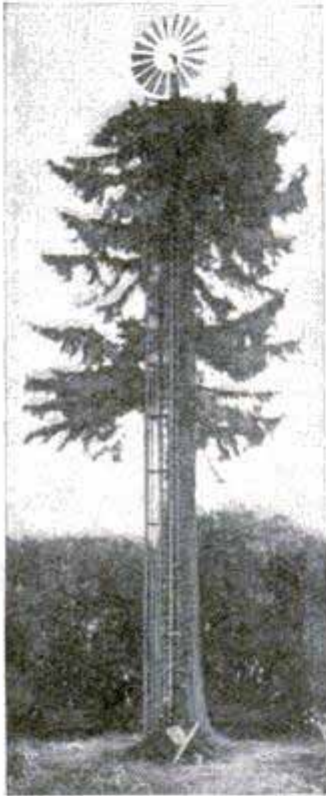
cast down, and is a very important unit, indeed, for he saves the company several thousand dollars each year in avoided tire cuts and punctures.

The tool in "Magnet Bill's" right hand is a big steel magnet strapped

to the end of a shovel handle, and in the other hand is a pail. His eyes are constantly cast down because his job is to remove from the roadways every nail and bit of iron or steel that might cause a puncture.

WINDMILL MOUNTED ON A LIVE TREE

54 On Vashon Island, in the Sound between Seattle and Tacoma, may be seen a windmill rising out of the foliage of a fir tree. The tree trunk is the tower that supports the windmill, and against one side of it is erected a ladder, the power-transmission shafting, etc. The well is at the foot of the tree.



WASHABLE WALL PAPER

To combine the hygienic properties of a good oil paint with the pleasing effect and artistic color combinations of ordinary wall hangings in a paper fabric, would seem a rather difficult accomplishment, but a German concern has recently brought out a product which is said to be a successful solution of the problem and little more costly than ordinary wall paper.

The resistance of the new fabric against processes of disinfection and against ordinary cleaning has been officially tested. Daily washing and brushing with water for 8 to 10 consecutive days had no injurious effect, nor did a 1-per-cent solution of corrosive sublimate do any harm, while some colors did not withstand soap and soda solutions.

This wall paper is made in several kinds and patterns from the plainest to the most ornamental and artistic.

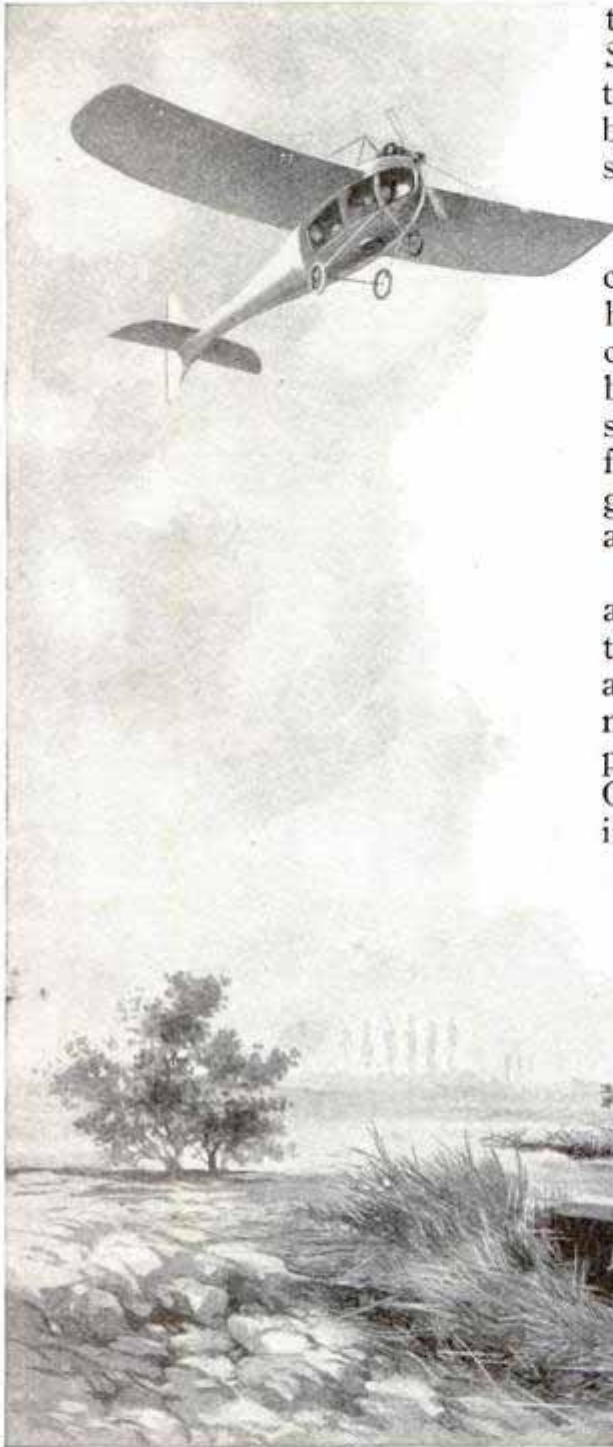
WET-CORK FILLING FOR MOTOR TIRES

An inventor has recently planned and constructed automobile tires in which the air chamber is replaced with wet compressed cork. Tests show that this tire compares favorably with the pneumatic as regards elasticity, and is far superior to the solid rubber tire. Taking the elasticity of iron as a unit, that of solid rubber tires would be represented by 5, of the cork tire, 10 to 12, and of the pneumatic tire, inflated with air of six atmospheres' pressure, 15; all being subjected to the same load. The elasticity of cork depends on the great number of air holes it contains, making it, in fact, a natural pneumatic. The cork filling or core is first inserted in an inner casing of rubberized linen or chrome-tanned leather, and then into the outer rubber tire. This new tire, the inventor claims, will remain equally elastic in hot and cold weather, will not suffer from punctures, retaining, even if the outer rubber tube is cut through, its resiliency; it is also much cheaper.

HIDING AN ARMY FROM AERIAL SCOUTS

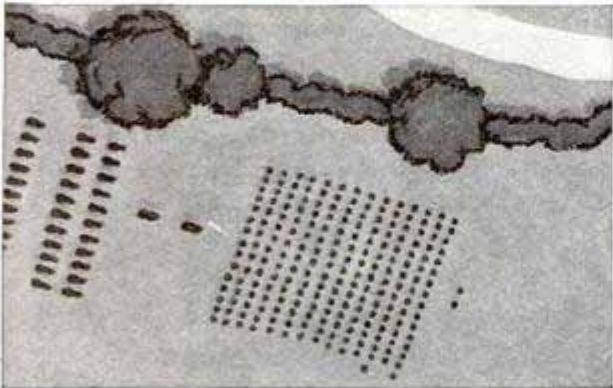
604 Although the scouting aeroplanes of the Red army, in the recent British army maneuvers, kept the commander informed of the movements of the greater part of the Blue army, they failed to discover the whereabouts of the 4th Blue division. It transpired, however, that the commander of this division had moved his forces warily by night, and had taken every precau-

At Fir Tree Farm, on Vashon Island between Seattle and Tacoma

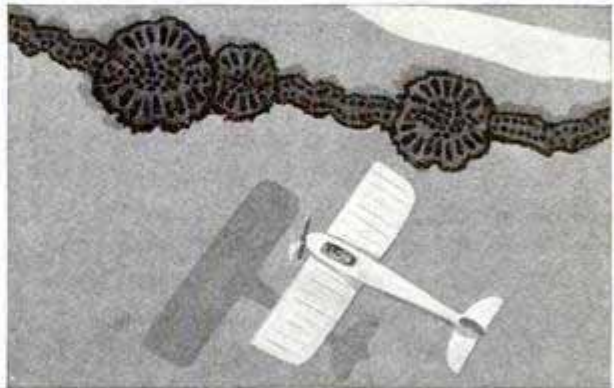


tion in the early dawn when nearing Saffron Walden to hide the marching troops. The night had been dark, there being no moon, and the morning was somewhat misty. Whenever the noise overhead announced the approach of a Red biplane, the troops halted and crouched down under the cover of hedgerows. Every small wood and copse was also taken advantage of, both the infantry and cavalry being successfully hidden in this manner from the searching scrutiny which began immediately the light rendered aerial observation possible.

Field batteries of the contending armies, wheeled into the desired position, were masked from the gaze of the airmen in many ingenious ways. The masking of batteries also played an important part in the maneuvers of the German army, one of the accompanying illustrations showing a German battery hidden from the aerial corps.



Gun of a German Battery Hidden from the Eyes of Aerial Scouts by a Roof Consisting of Canvas Laid over a Framework and Covered with Earth



How Army, Moving in the Open, Looks to Aerial Scouts

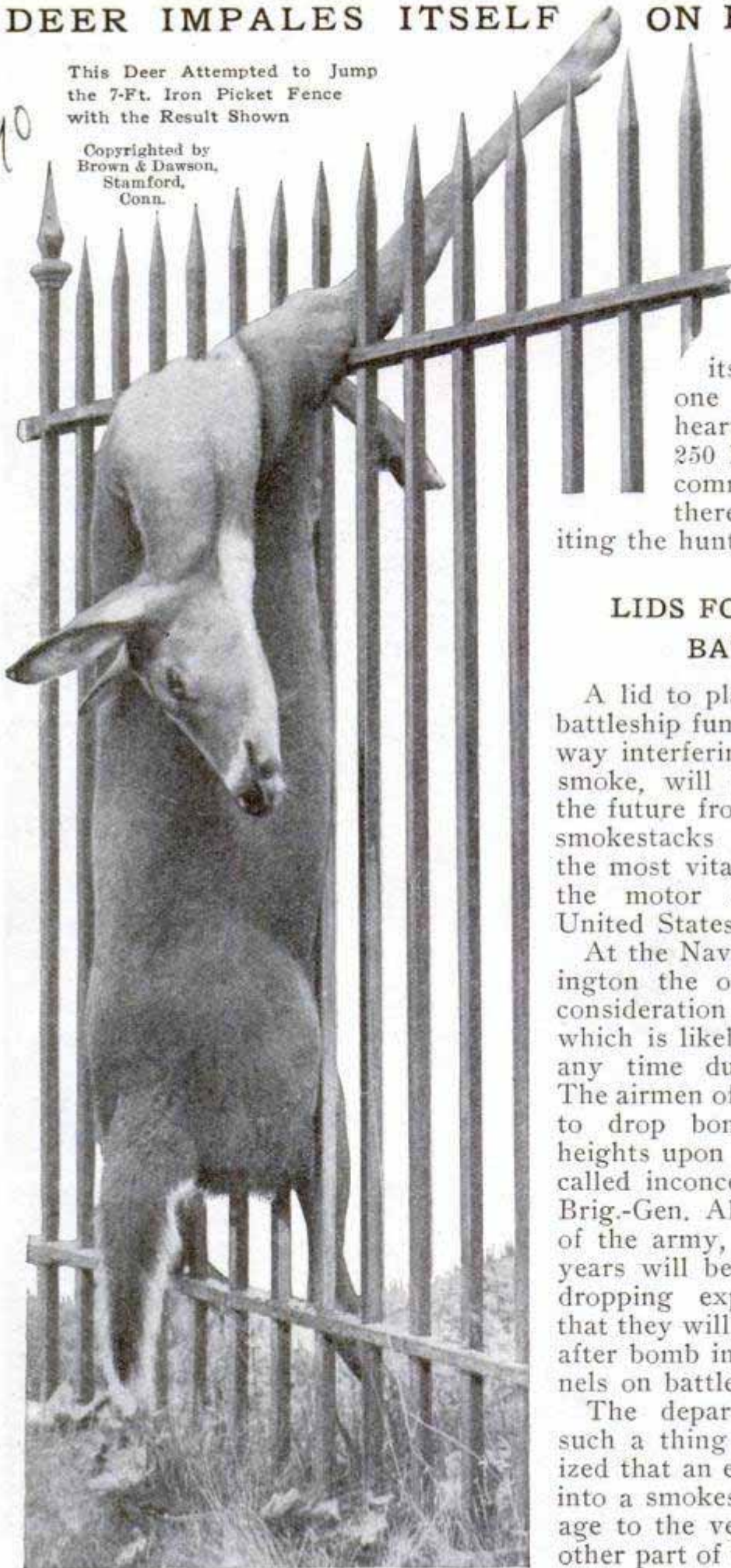
Marching Army Hiding from Aeroplane by Crouching under Trees and Hedgerows

DEER IMPALES ITSELF ON PICKET FENCE

This Deer Attempted to Jump
the 7-Ft. Iron Picket Fence
with the Result Shown

Copyrighted by
Brown & Dawson,
Stamford,
Conn.

590



A full-grown deer recently ran through the village of Noroton, three miles north of Stamford, Conn., and tried to jump a 7-ft. iron picket fence surrounding an estate. It missed the jump by a few inches and impaled itself on the sharp pickets, one of which entered its heart. The animal weighed 250 lb. Deer are now very common in Connecticut, as there is a game law prohibiting the hunting of them.

LIDS FOR FUNNELS OF
BATTLESHIPS

A lid to place over the mouths of battleship funnels, which, while in no way interfering with the emission of smoke, will prevent the airman of the future from dropping bombs into smokestacks and thus destroying the most vital parts of the vessels—the motor sections—is what the United States navy wants.

At the Navy Department in Washington the officers have had under consideration this serious proposition which is likely to face any nation at any time during this airship age. The airmen of today are being trained to drop bombs from fairly great heights upon targets of what may be called inconceivably small sizes, and Brig.-Gen. Allen, chief signal officer of the army, says his men in a few years will be so adept in the art of dropping explosives from airships that they will be able to deposit bomb after bomb in the mouths of the funnels on battleships.

The department wants to make such a thing impossible. It is realized that an exploding bomb dropped into a smokestack can do more damage to the vessel than if it hits any other part of the ship. Hence the de-

sire for a lid. The engineers and mechanics in the department are now working on designs for such a protection.

AUTO DELIVERY WAGON LOOKS LIKE LOCOMOTIVE

The introduction of the motor-propelled vehicle in modern business has enabled those who so desire to greatly alter the general appearance of their delivery vans and thus obtain much publicity and advertisement by adopting peculiar shapes, sizes or colors for their vehicles. There are numerous examples of this tendency throughout the country, but one of the most curious is to be found in Pittsburgh, where a clothing firm has built its auto delivery wagon in the shape of a locomotive. It has a tall stack at the front, before which is placed a headlight. The under portion of the body is equipped with a cowcatcher and the chauffeur sits in a cablike superstructure. The goods to be delivered are



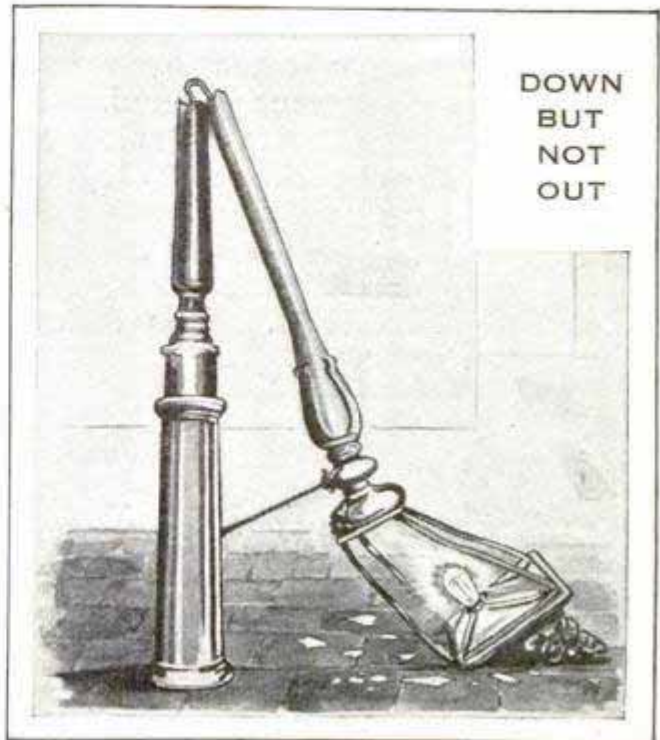
Auto Delivery Van of a Pittsburgh Merchant Built to Resemble a Locomotive

carried in a structure to the rear of the chauffeur's cab which resembles a locomotive tender.

TUNGSTEN LAMP BURNS IN SPITE OF COLLISION

Taking advantage of the collision between a large motor truck and a lamp-post, which resulted in the latter being bent entirely over, so that the glass-enclosed tungsten lamp was inverted and almost touched the pavement, while half of the post remained upright, the manufacturers of this lamp had the doubled-up post photographed and are using it as an adver-

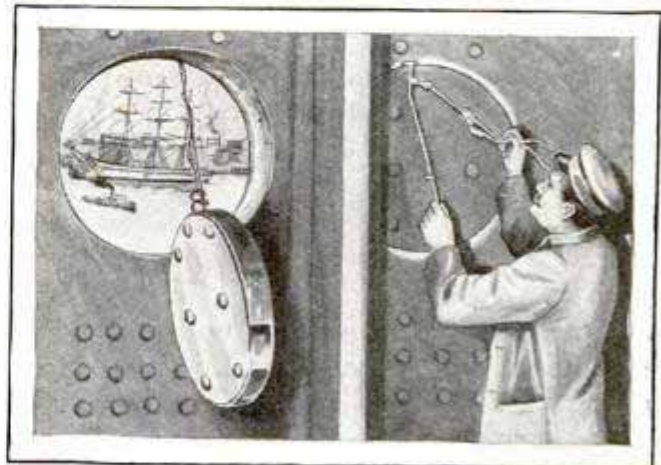
tisement. The lamp continued to burn despite the accident and the advertisement reads as follows:



Tungsten Lamp That Kept Burning after Wreck of Lamp-Post

CUTTING THE PORTHOLES IN A GREAT LINER

The making of the portholes of a great liner is a part of the construction accomplished after the thick steel plates of the vessel's sides have been riveted in place. The accompanying illustration shows how it was done on the great German liner "Imperator," the operator seen at the right being in the act of cutting out a porthole.

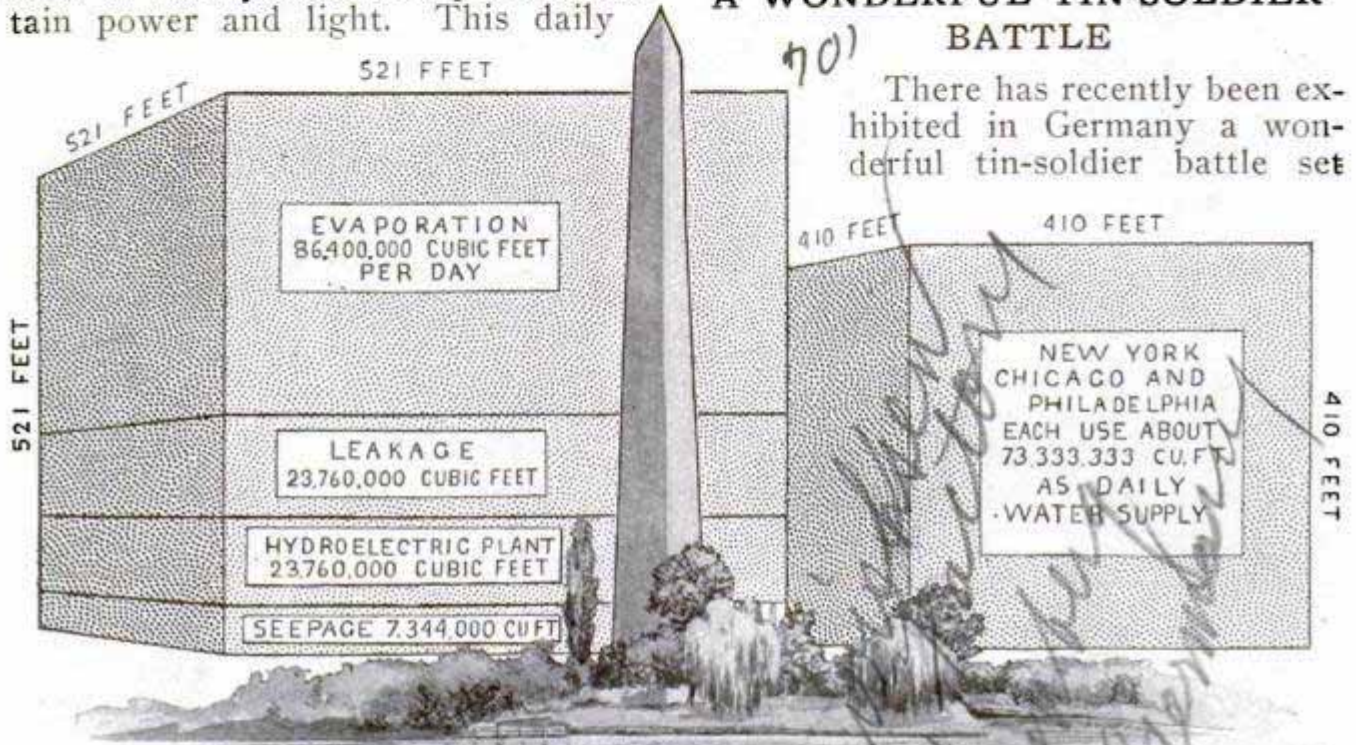


Boring Out the Portholes of the German Liner "Imperator"

ENORMOUS LOSS OF WATER AT GATUN LAKE

The magnitude of the great lake at Gatun, on the Panama canal, which is now beginning to fill up behind the Gatun dam, is indicated by figures which have been recently compiled by the engineers on the unavoidable daily loss of water in the lake due to leakage at gates and locks, seepage through the lake bottom, evaporation, and the operation of the hydroelectric plant to obtain power and light. This daily

The amount of daily wastage shown by these figures would fill a water tank 521 ft. in each dimension. New York, Chicago and Philadelphia each use between 500,000,000 and 550,000,000 gal. of water per day for all purposes, or about half the daily wastage from the Gatun lake.



A WONDERFUL TIN-SOLDIER BATTLE

There has recently been exhibited in Germany a wonderful tin-soldier battle set

loss will amount to 1,059,420,000 gal., or about 141,000,000 cu. ft. of water. The evaporation from the lake is placed at 1,000 cu. ft. a second; the leakage at 275 cu. ft.; the seepage at 85 cu. ft., and the amount used by the hydroelectric plant at 275 cu. ft.

Eight wet months and four dry months are shown by the tables of 22 years' observations on the Isthmus, and these observations indicate that from January to April of each year the aggregate losses of water from the lake will be greater than the inflow. Making an allowance for the water used in 48 lockages a day, which is the most that can be handled in the canal, the engineers find that the lake will always have enough water, even in the dry season, to allow 30 ft. in the canal.

The Daily Water Loss of Gatun Lake Indicated by Comparison with Washington Monument

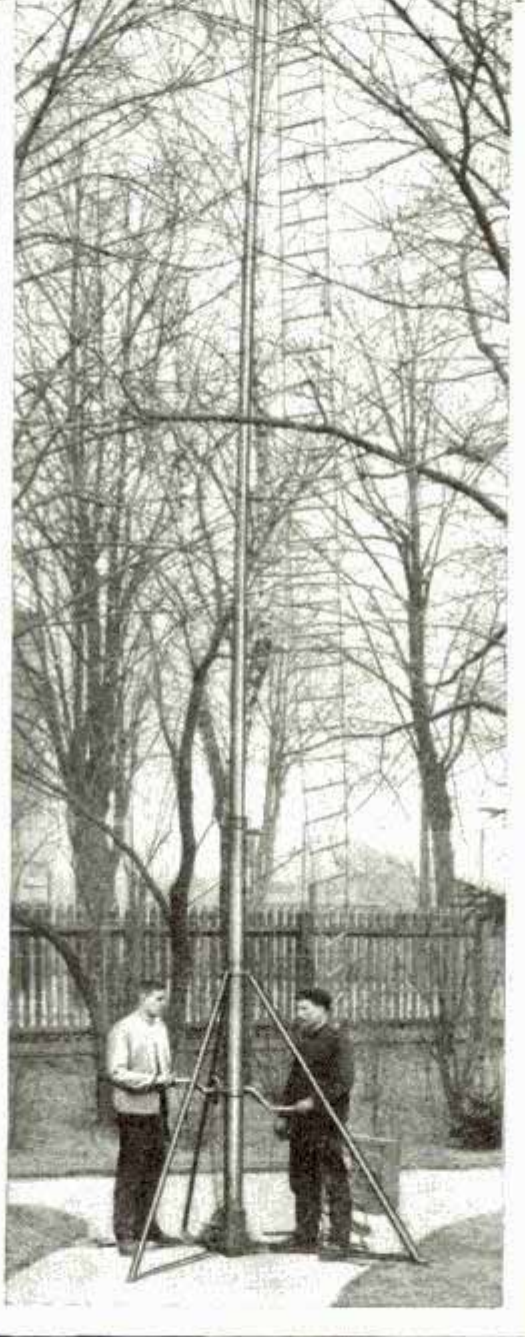
having no less than 14,000 tin soldiers from a well known Nuremberg toy factory. Upon a battlefield about 16 ft. square is being reproduced the bloody battle near St. Privat between the German and French armies, in 1870. In the right corner back of the village of St. Privat, whose church has already been set on fire by the shots, the French troops are shown in the forest of Gaumont, where they are receiving in a storm-attack the advancing German troops. The village of Roucourt is already taken by the Germans and the set piece shows the strongest phase of the battle, and is otherwise rich in historically interesting scenes.

made by Heinwisher



**USE TELESCOPIC
MAST TO TRIM
TREES**

A novel use for the type of portable observation tower designed in Germany particularly for military purposes, and consisting of a telescopic mast with platform at the top, has been found in Berlin's parks. The illustration shows the mast being used as an accessory in tree-trimming. The mast proper comprises a number of steel tubes, which telescope, one in another, the mast being extended or collapsed by one or two operators, turning the crank handles as shown.



German Military Observation Mast Used for Tree-Trimming

**EXPLOSIVES AS
MEDICINE 438**

The statement that violent explosives, such as cordite, for instance, are a good cure for seasickness or insomnia, has been hailed with considerable levity, yet

diers are claimed to have discovered the strong sedative effect of cordite, and it is claimed that an English

the recommendation of nitroglycerine as a cure for the former is beginning to obtain support. It is well known that nitroglycerine dilates the blood vessels, and its use as a cure for seasickness is based on the assumption that this complaint is caused by cramps of the blood vessels and consequent anemia of the central nerve system. The dose is one spoonful of a mixture of 20 drops of a 1-per-cent solution of nitroglycerine in about one-seventh of a quart of distilled water. Its use, however, is not recommended without the advice of a physician.

Cordite, the fibrous, cottonlike explosive, largely used in modern warfare and in blasting, is likewise stated to be a fine remedy for insomnia. British sol-

Dr. W. Burwinkel, German

Annua. Sept 21, 1912

Tommy tore off a piece, when suffering from sleeplessness, chewed and swallowed the fiber, and was sleeping a few moments later. This is another experiment which should not be tried without the consent of a doctor.



German Policemen in Africa Mounted on Zebras

POLICE ZEBRAS OF GERMAN AFRICA

The enormous death rate among horses brought to Africa by the Germans early led to attempts to break the native zebras to the saddle and to crossbreed them with horses in order to procure mounts for troops and civil officials. Not very promising, at first, these attempts have lately been crowned with success, as witnessed by the accompanying illustration which shows two police troopers mounted on trained zebras.

☐ Wireless messages are exchanged without difficulty between Lima and Iquitos, in Peru, over 600 miles apart, in spite of the facts that the Andes rise to a height of over 18,000 ft. between the two points and that the Lima station lies close to the foot of the mountains.

DEVICE MAKES ENGINE

749 SPARK VISIBLE

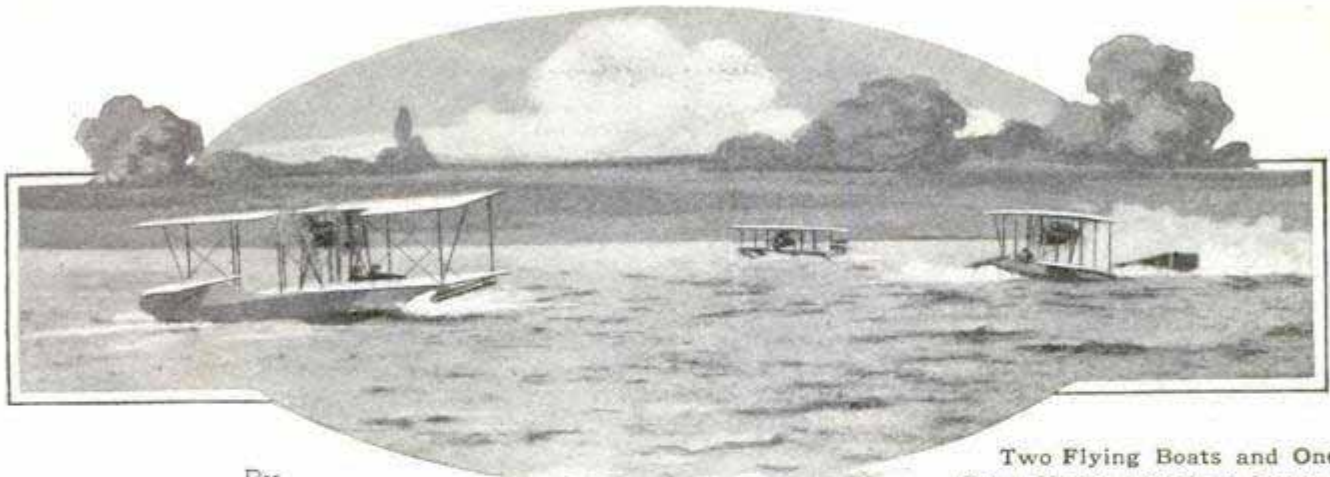
An adaptation of the Crookes tube is being used to tell from the outside whether the sparks wanted on the inside of a motor cylinder are properly and regularly produced. The instrument, which has the appearance of a very thick lead pencil, sharpened, is a copper tube containing a small Crookes bulb. The pencil point is an electrode set in hard rubber, and a nonconductive plug with a hole through the center is inserted in the butt end. In operation, the pencil-like point is placed against any exposed portion of the ignition circuit of the motor, such, for instance, as the top of the spark plug; the observer's hand clasps the copper tube firmly,

to ground whatever amount of current may be able to pass through, then puts his eye to the hole in the butt end, and when the ignition circuit is closed to produce the spark, a light becomes visible in the tube. If this light is strong and steady, the spark is of the same character; if no light appears, the plug is short-circuited, and if the light is irregular, the spark is poor.

FIRE ENGINES PROVIDED WITH ELECTRIC LAMPS

752 Storage batteries have been installed on the engines of the Memphis fire department, and tiny electric bulbs now illuminate the steam and water gauges and other parts of the machinery requiring light and close attention. Until this idea was adopted, the engineer had to run about the engine with a lantern, the light of which was unsatisfactory, particularly on rainy nights.

FLYING MOTORBOATS, THE 1913 SPORT



By
GLENN H. CURTISS

Two Flying Boats and One
Older Hydro-Aeroplane Jockey-
ing for Position at Start of a Race

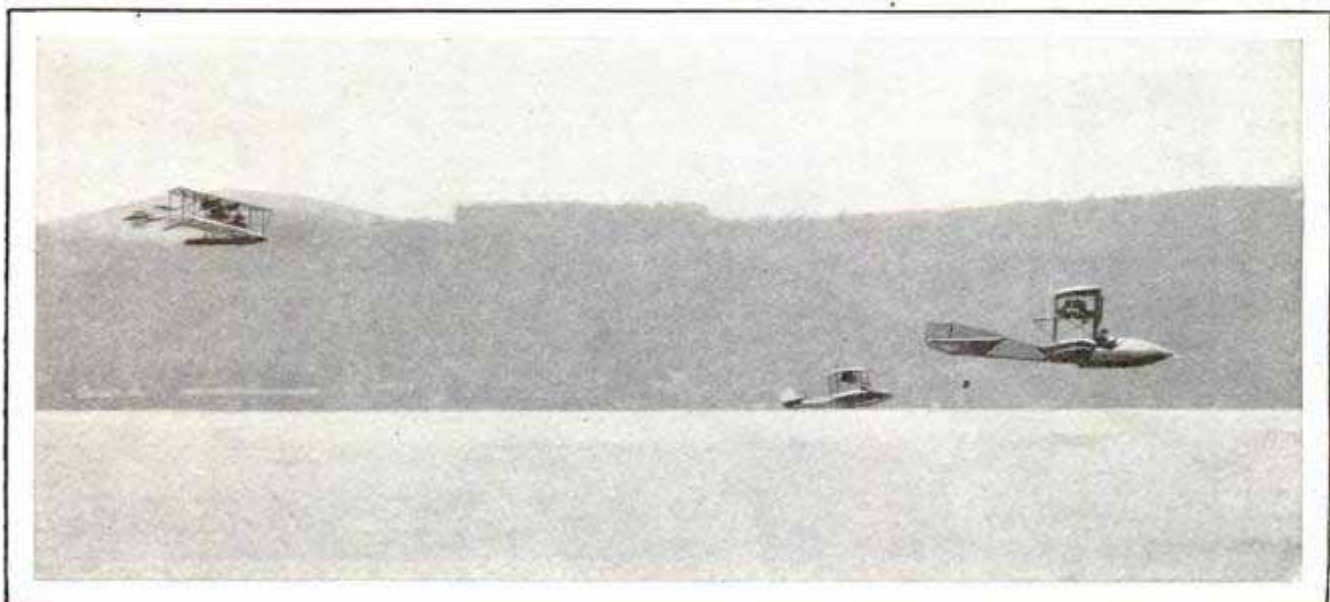
THE flying boat has now placed aviation among the "safe and sane" sports. Flying has rightly been referred to as the acme of ease, comfort and exhilaration. The landings have not always been so delightful, but with the flying boat it is as easy to alight from a flight as it is to steer an automobile alongside a curb and stop.

In the first recorded race of these craft, recently held on Long Island, the sight of three machines jockeying for position was inspiring, while the close finish of the return trip from the outer buoy would stir the blood of any sportsman. On both the Atlantic and Pacific seaboards this fall duck shooting from hydro-aeroplanes and flying boats has been attempted with remarkable success.

Water flying is safe mainly be-

cause there is always a good place to alight. It is not necessary to guide the machine along a narrow course for starting or to pick one's ground in landing. The surface beneath is smooth and level and one may head in any direction with safety. There are no fences, trees, telegraph wires or buildings to dodge, or which will cause eddies in the air and upset one as he tries to land. Winds over the water are invariably much steadier than over land, and if, through carelessness or inexperience, the operator does make a bad landing, or plunges the boat at too steep an angle into the water, or strikes a wing too hard, the accident cannot be grave. The machine is not seriously damaged and the operator is none the worse, except for his "ducking."

The first development in water fly-



Finish of Race of Flying Motorboats, David McCulloch, with Glenn H. Curtiss as a Passenger, in the Lead

ing, the hydro-aeroplane, has these advantages, but the later flying boat with its large surplus of buoyancy has all the advantages of a motorboat and a flying machine combined. It is as seaworthy as any motorboat of its size, and flies as well as any aeroplane of equal proportions.

Now that we have a safe system of flying, the development of aviation is sure and unlimited. For racing, nothing can compare with the flying boat. There is the same chance to jockey for position as in yacht racing, and every opportunity for the airman to exhibit his skill in rounding the buoys and making his starts and landings. I can picture no prettier nor more impressive sight than a fleet of flying boats rising from the water at the start of a race, or coming down the course "neck and neck" at the finish.

There is now no reason why a man who can afford to own a flying boat should not enjoy the sport. The flying boat may be kept in a boathouse, anchored to a buoy or housed in a hangar on land. With an equipment of folding wheels, the machine may be started on land and run out into the water under its own power.

On the water, the flying boat is handled like an ordinary motorboat, although the controls resemble those of an automobile. The rudder is operated by a steering wheel, which also operates the device for elevating. The engine is controlled by a foot throttle. With the engine throttled, the machine will turn about within a radius of 100 ft. When the throttle is opened, the machine gradually climbs on top of the water, and after the first hundred feet is planing on the water much the same as a hydroplane. In this manner it runs on the water until a speed of 45 or 50 miles an hour is attained, when a slight movement of the elevating device will bring it into the air.

The standard machine flies at about 60 miles an hour. To alight, the operator simply sails along close over the surface of the water and throttles his engine. The boat descends until it touches the water, and if the engine is

kept throttled, the boat glides over the water until it has lost its speed, when it settles down and once more becomes an ordinary motorboat.

The flying boat used has a hull 25 ft. long by 2½ ft. beam, it has 250 sq. ft. of wing surface and has a carrying capacity of 600 lb. It will carry fuel supply for a flight of 400 miles. It is fitted with dual control, so that either the operator or passenger, who sit side by side, may assume full control of the machine.

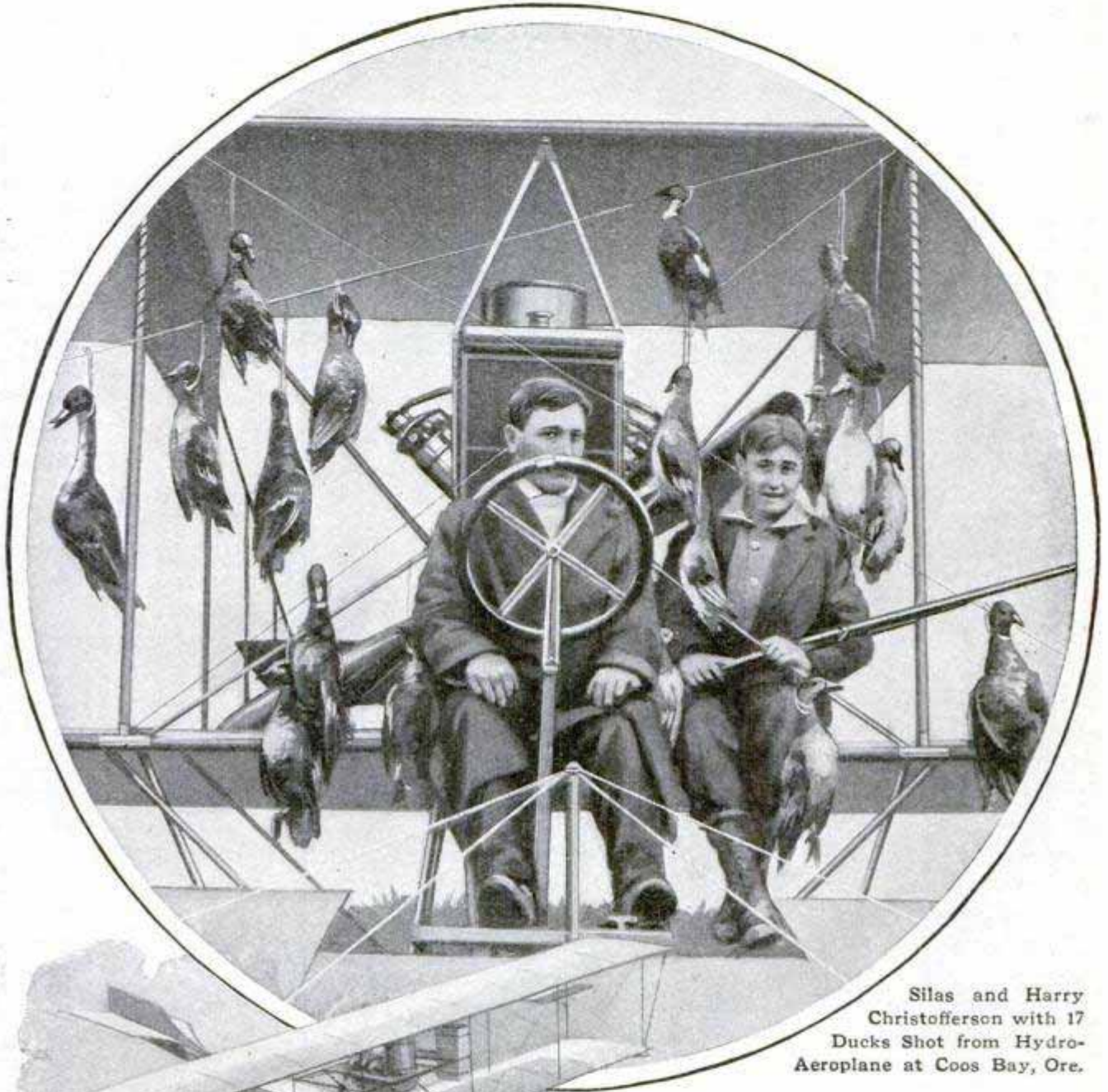
The military advantages of the flying boat have already been recognized. Both the Army and Navy departments of the United States have ordered this new machine, and others are being built for the German and Russian navies, while a French company is building them for France, Italy and England.

The army has established its winter station at North Island, San Diego Harbor, where a number of officers are being sent to be trained in the operation of the flying boat and in aviation generally. The coming of all this activity creates a demand for operators, and with the certainty that the flying boat will be taken up largely as a sport, as well as for military and naval purposes, young men interested in aviation will be encouraged to continue their studies and become familiar with the construction, care and operation of the latest type of flying machine, the flying motorboat.

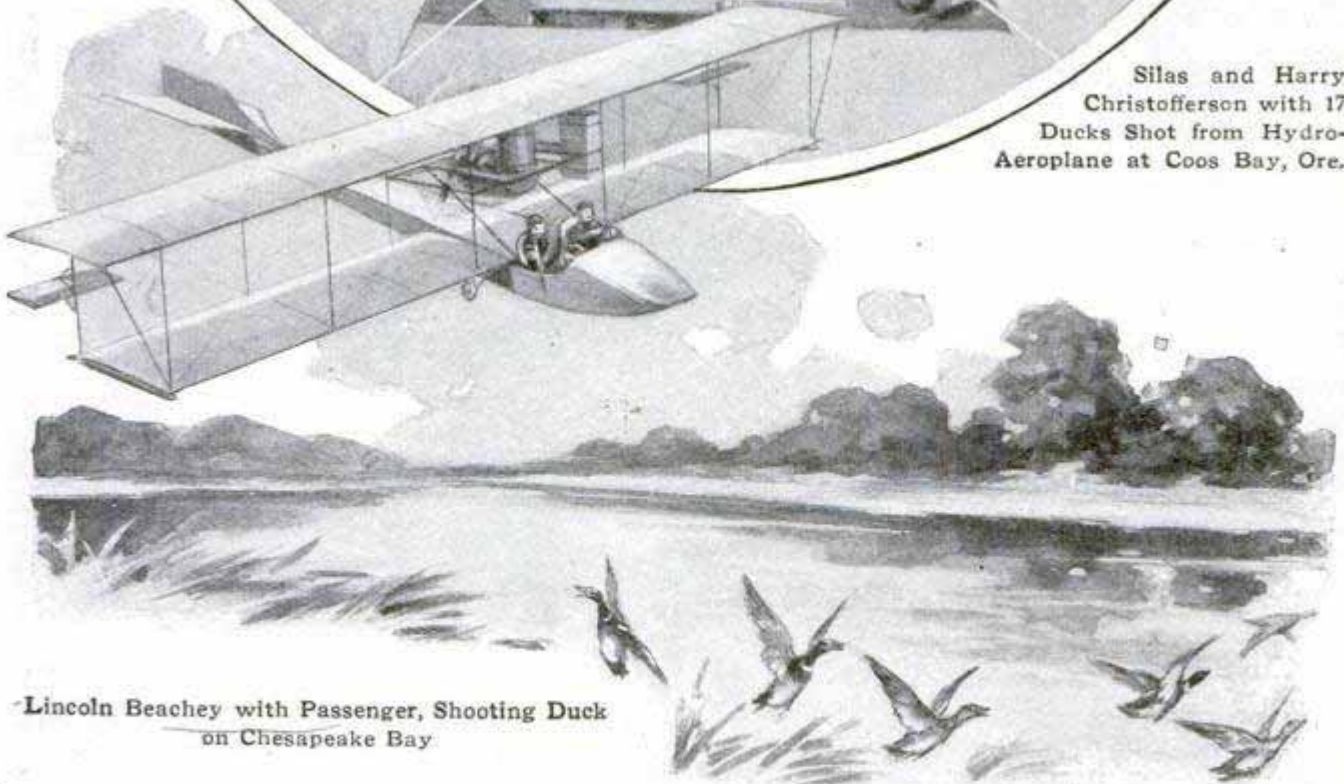
MOTION-PICTURE SHOW IN 448 PASSENGER STATION

Fully understanding how slowly the time passes when waiting for a train, particularly for a train that is late, the railroad officials having to do with the equipment of the new union passenger station in Kansas City have favorably considered the idea of providing a motion-picture show in the waiting room. Such an idea for the entertainment of passengers while waiting for trains is new, and should prove popular.

DUCK SHOOTING FROM FLYING MOTORBOATS



Silas and Harry Christofferson with 17 Ducks Shot from Hydro-Aeroplane at Coos Bay, Ore.



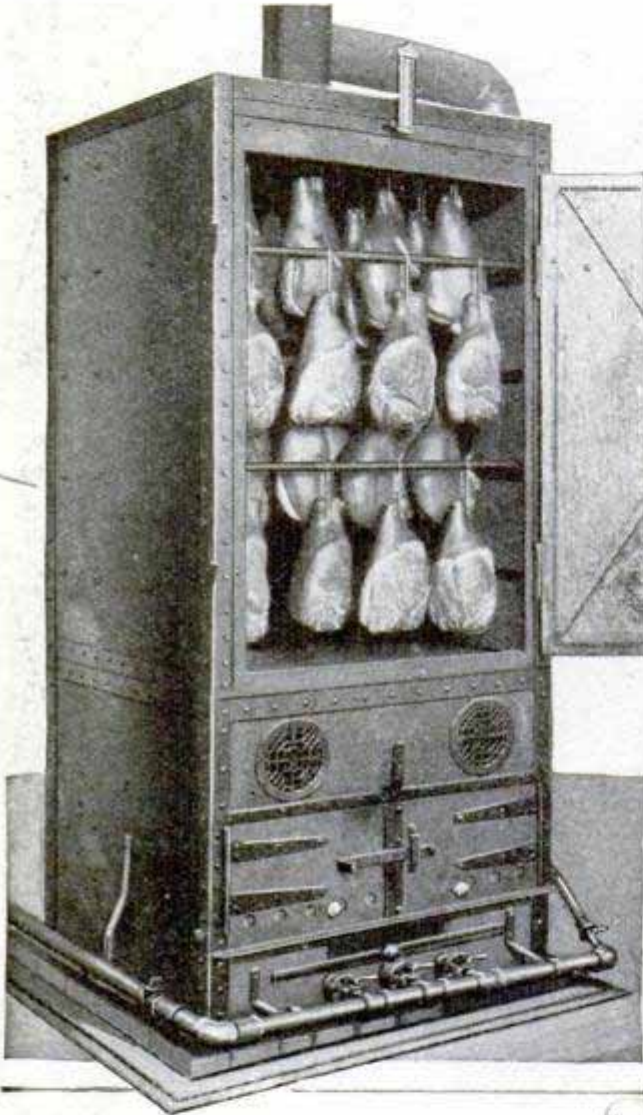
Lincoln Beachey with Passenger, Shooting Duck on Chesapeake Bay

for J. W. Lamp 606 S. Broadway
Dalhousie, Md
GAS SMOKEHOUSE FOR THE CURING OF HAMS

The smoking of hams, frankfurters, and the like, is accomplished by one meat concern in Baltimore, Md., in a

the temperature desired, generally 140 degrees.

The gas smokehouse has a capacity of 30 medium-sized hams, or 175 lb. of frankfurters.



Curing Hams in a Gas Smokehouse

smokehouse heated by gas, which is said to be a new departure in the curing of meats.

It is claimed that the gas smokehouse has the distinct advantage over the wood smokehouse of being entirely independent of weather conditions, and that the saving of time is considerable. The practice is to hang the meats in the smokehouse cold, and then to apply the heat from the gas burners only. When a temperature of 120 deg. is obtained, the sawdust, which may be cedar, oak or hickory, is ignited and the smoke applied to the meat. Then the gas heat is regulated according to

THE ADVANCE OF SHIPPING IN THE LAST YEAR

758
The amount of shipping registered at Lloyd's at the end of the fiscal year ending June 30, 1912, numbered 10,445 vessels, approximating 21,500,000 tons. The vessels built during the year numbered 684, of which 623 were steamships and 61 sailing vessels. A feature of interest is the growing number of merchant ships equipped with improved refrigerating machinery, and used for oversea carriage of frozen and chilled meats, fruits, dairy produce, and the like. At present there are 161 refrigerated ships, and 22 are under construction.

The number of vessels equipped with wireless telegraph is 1,392, as compared with 1,013 a year ago. Six hundred and twenty-five are equipped with submarine signaling apparatus.

AN AERIALY PROPELLED "WATER BUG"

The aerially propelled water craft shown in the accompanying illustration is called the "Water Bug" by its owner. He says it is constructed on the principle of the flat stone skipping over the water. The little vessel is 18 ft. long and 9 ft. wide. It draws but 2 1/2 in. of water.



The "Water Bug," a Small Craft Driven by an Air Propeller

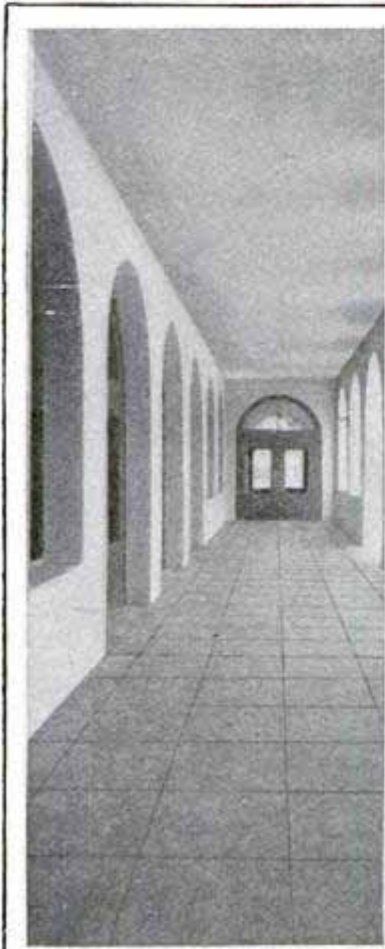
Henry Seidel

606 So Broadway
Balt. Md.

The Engineer Nov. 1, 1912

725

APARTMENT HOUSE ONLY ONE STORY HIGH



Main Loggia of Apartment House



Upper View—Main Entrance, One Pillar of Pergola Being Visible to the Right.

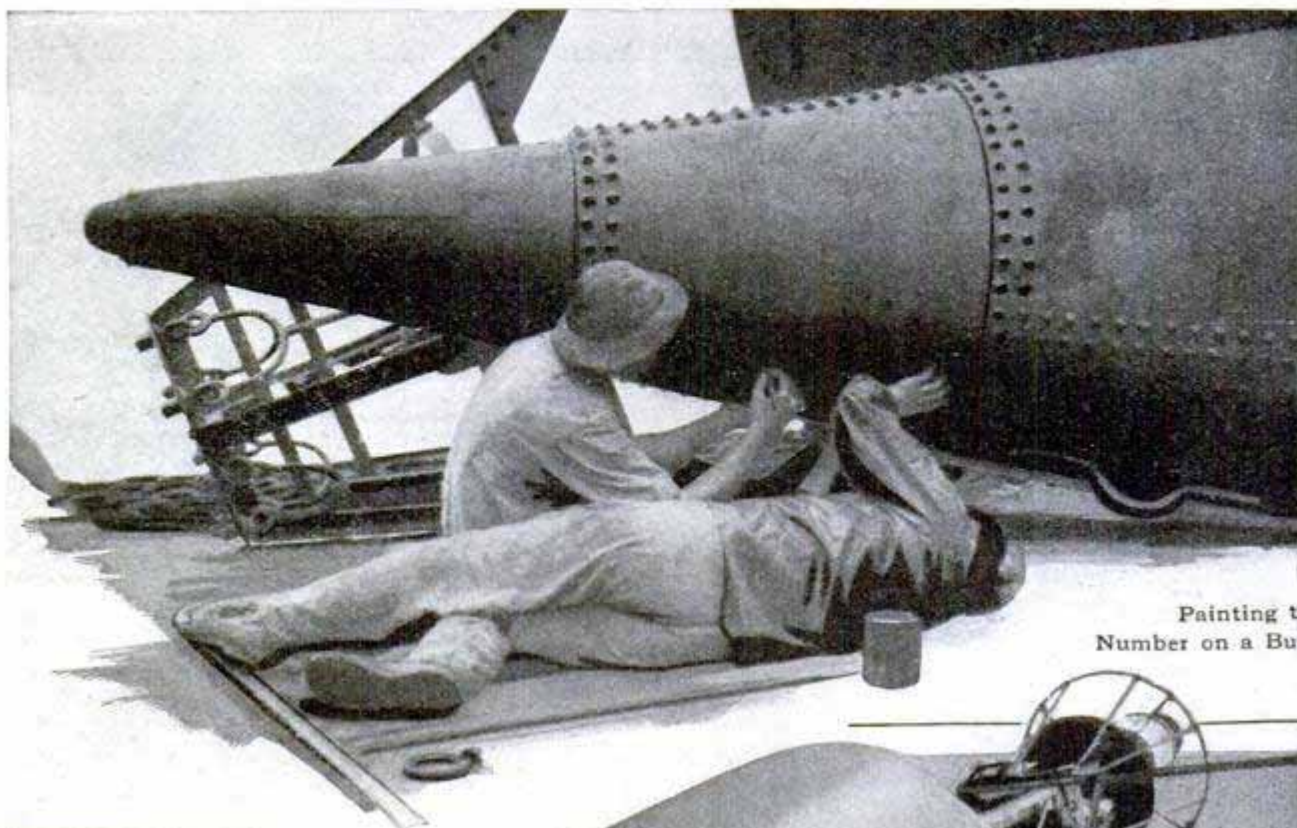
Lower View—Wing of Cottages with Terraced Garden Main Loggia in Background

Apartment houses only one story high have been evolved by an architect of Sierra Madre, Cal., after the Spanish mission style. The cottages or apartments are built on the north and west sides of a town block, leaving the south and east sides open for the sun to reach each cottage and allow the residents an outlook on a green terraced lawn. Designed for small families, each apartment consists of only three rooms with an entrance loggia, which can be used for a sleeping porch or sitting room. While they all join in one long rambling structure, the individual apartments are so cleverly constructed that they give no less privacy than a cottage in a well built-up neighborhood. Each family has its own well defined bit of garden and walk, which merge harmoniously into the larger lawn.

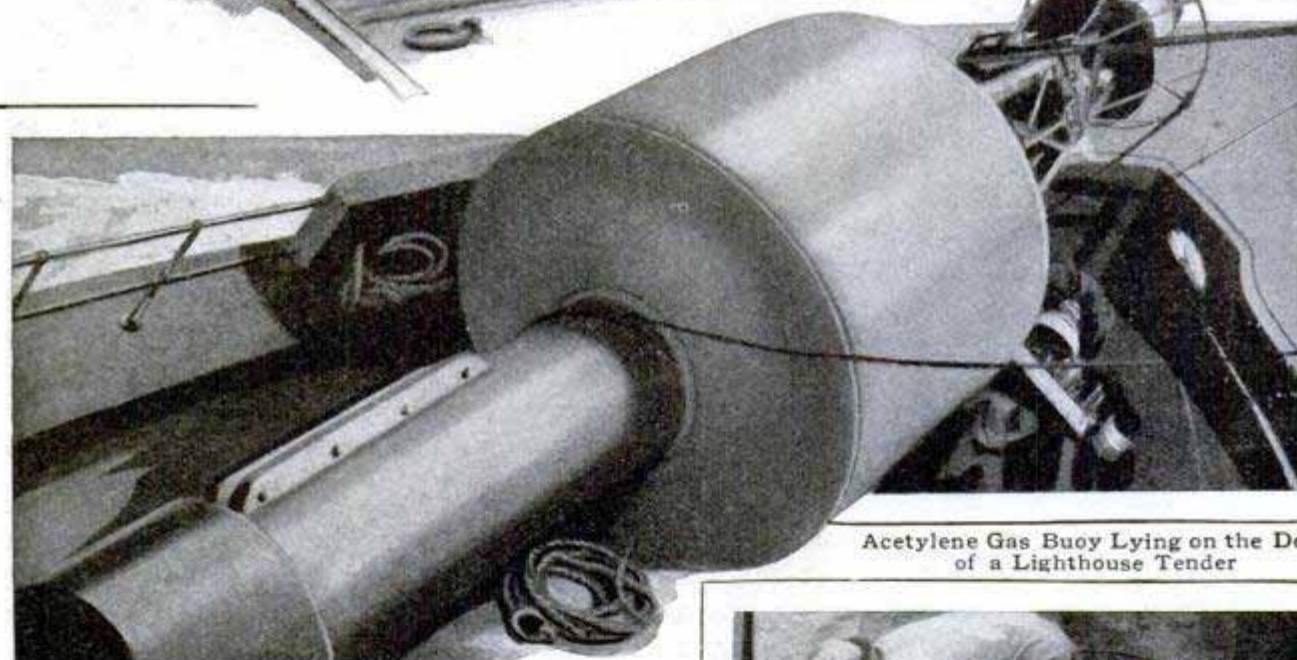
The entrance to the grounds and cottages is a very beautiful arched doorway which leads directly to the pergola in the center of the grounds. This pergola is for the joint use of the residents. Green foliage will eventually cover this structure, but until it is sufficiently matured, palm fronds have been utilized for shelter from the sun.

As many as 72 war aeroplanes lined up in a recent review of the French air fleet. Every machine was ready to take to the air, the commanders, pilots and observers standing at attention in front of the machines during the inspection. After a brief and businesslike review by the war minister, machine after machine rose and flew away, 20 of them leaving for posts on the eastern frontier.

DRESSING THE FAITHFUL LIGHT BUOYS FOR

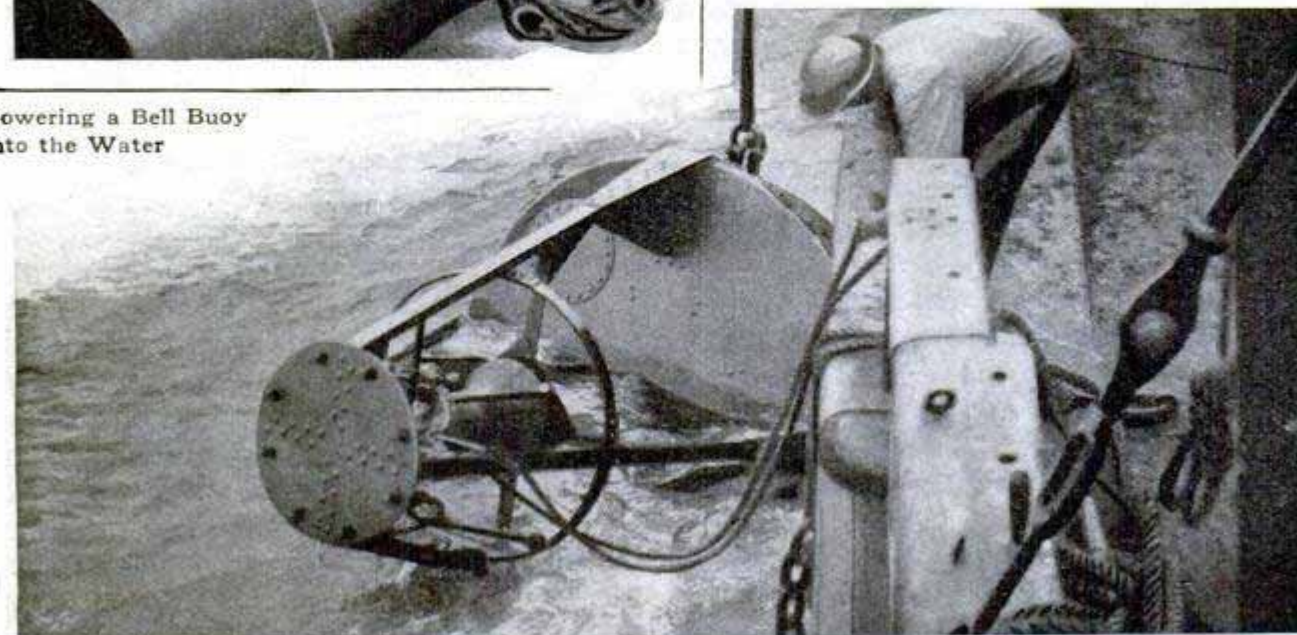


Painting the
Number on a Buoy

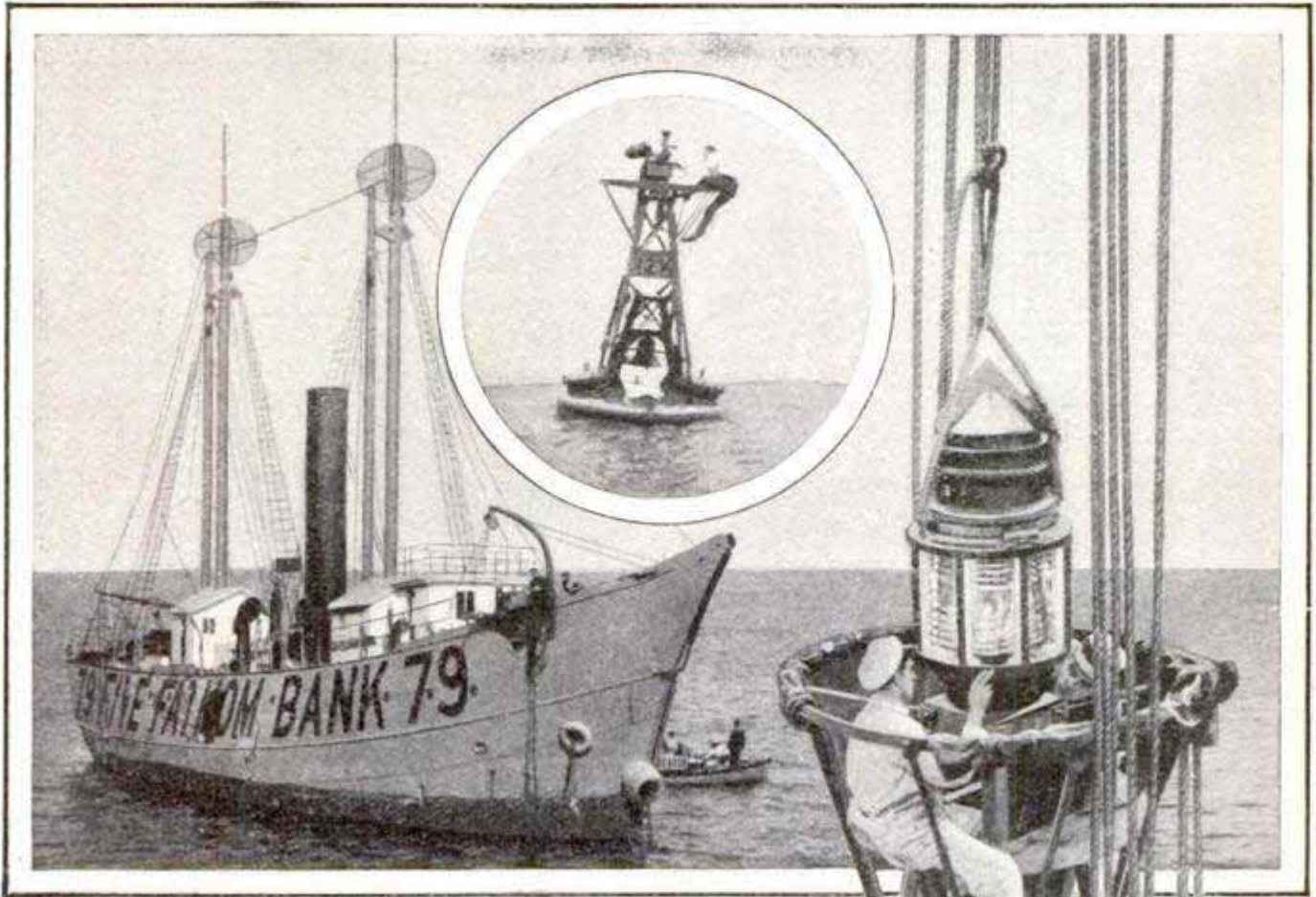


Acetylene Gas Buoy Lying on the Deck
of a Lighthouse Tender

Lowering a Bell Buoy
into the Water



THEIR STORMY WINTER SEA SERVICE



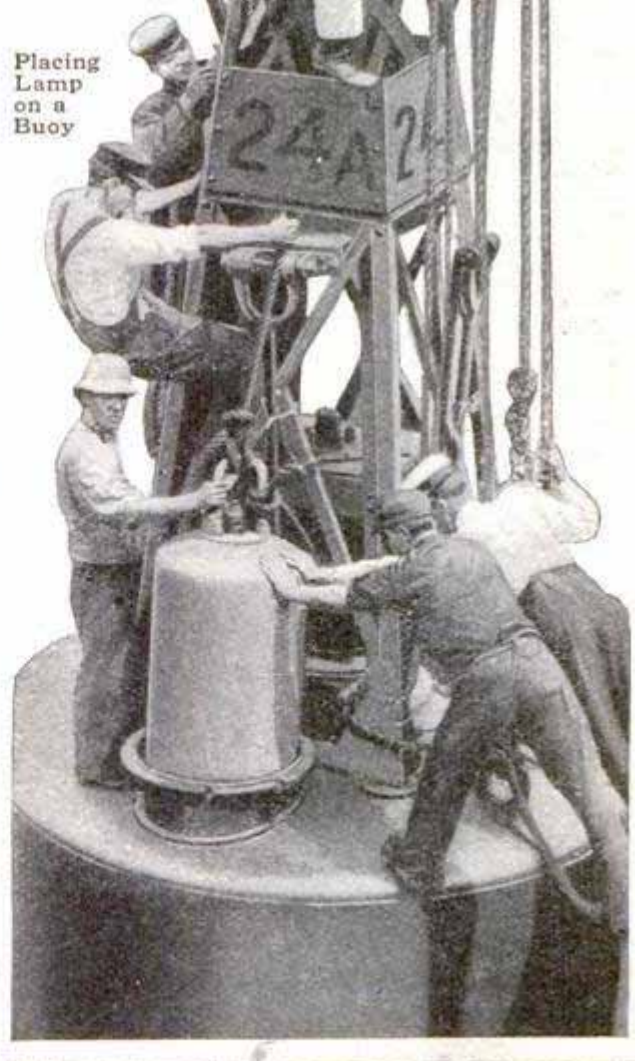
A Lightship on a Five-Fathom (30-Ft.) Bank.
Round Picture — Fixing the Lamp
of an Acetylene Buoy

Although the navy and the revenue service have been made familiar to the general public of the country through the press, the operations of still another maritime department of the United States government, that which has to do with the safeguarding of navigation, are but little known.

In the accompanying illustrations are shown a lightship, and five scenes having to do with the preparing and placing of the many buoys, of which there are several types, that mark channels, indicate dangerous shoals, and the like.

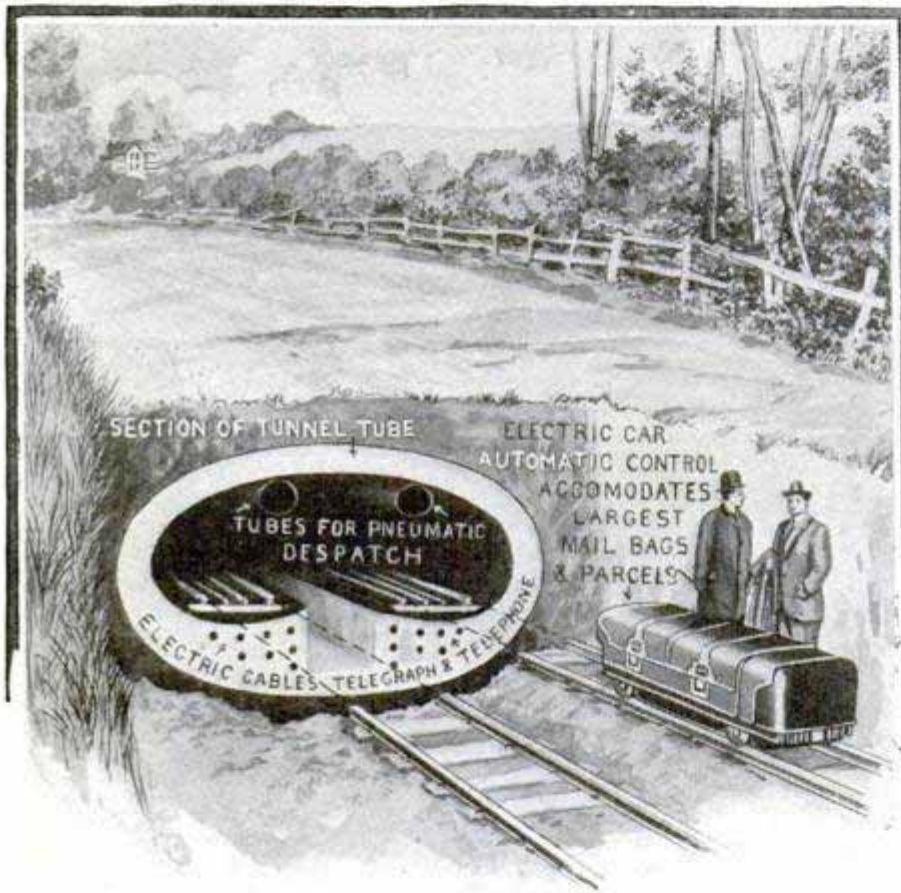
¶ In order to make inn and hotel accommodations for automobile tourists in England more satisfactory, the Automobile Association has placed in a large number of hotels cabinets, each equipped with a comb, brush, and clean towels, and has furnished its members with keys. Each hotel keeper is required to keep the cabinet supplied with clean towels.

Placing
Lamp
on a
Buoy



LONDON TO HAVE SUBWAY FOR POSTAL SERVICE

A subway for the carriage of mails, and incidentally to act as a duct for underground telegraph and telephone wires, is being seriously considered by the British government to relieve, at least a little, the present traffic congestion in the streets of London. It is proposed to construct a tunnel under the streets that will be about 9 ft. in diameter and have two tracks large



London's Proposed Subway for the Transportation of Mails

enough to accommodate a car 3 ft. wide by 6 ft. long. The tracks will be constructed on concrete foundations on either side of the tunnel and there will be a runway between them to be used as a footpath by persons whose business requires them to patrol the tunnel. Beneath the concrete platforms on which the tracks rest will be ducts for electric wires. The electrically operated mail cars, large enough to accommodate the largest mail bags, will, it is proposed, have a trunklike shape and be equipped with automatic controls. It is believed that this

system will be a great improvement over the pneumatic-tube system that is in use in this country and the underground system employed in Paris for the same purpose.

WHAT THE POPULAR FURS REALLY ARE

Although a great number of popular-priced furs masquerade under names that no actual animal claims as its own,

there is no particular secrecy about it. One of the fur concerns, for instance, publishes a catalogue to inform customers just what they are actually buying. Alaska bear, for example, is the best Minnesota raccoon, colored a dark brown; Adelaide chinchilla is the fur of a selected, soft-haired and delicately colored Australian opossum; French ermine is the fur of the white hare of France; Baltic fox is the fur of a large hare of northern Europe; Iceland white fox is white Thibet lamb, combed until the hair is straight; Kamchatka fox is the fur of the northern timber wolf;

Manchurian fox is the fur of a variety of half-wild dog from Manchuria; Yorkford lynx is Canadian wild cat; Baltic lynx is the large Belgian hare; Finland lynx is a species of Australian kangaroo; Siberian pony is selected Russian calf skin; Hudson seal is muskrat skins of selected quality, and inland seal is the skin of selected French white hare.

¶The recent Clinical Congress of Surgeons of North America, held in New York, set a new record for operations, the number being 3,000.

*Albrecht & Son
St. Paul
C. C. & Munnico*

TIRE AUTOMATICALLY CLOSSES PUNCTURES

A motorcycle tire that automatically closes any ordinary puncture it receives, thus preventing deflation, has been placed on the market. In this tire the tread portion is thicker than in the ordinary product, and when vulcanized, the tube is turned inside out. This, it is claimed, results in a sufficient compression of the rubber to securely close a puncture. The compression of the rubber is aided by an insertion of a high-grade nonelastic fabric.

MAKING GOLD SOFT

Pure gold can be softened by heating it for four days at the boiling point of water. At higher temperature it softens much more rapidly, taking but a few seconds at 400 deg. F. It takes much longer to soften alloys, however, and since gold and silver coins are not pure metals, it takes a considerable period for the softening. It requires 575 deg. F. for a period of 16 days to soften gold coins.

British Institute of Metals

CRAB USES THIMBLE AS A SHELL

A little crab that adopted an old brass thimble as an armor is shown in the accompanying illustration. This species of crab, which abounds on the shore of the Society Islands, in the Southern Pacific, must have some kind of house on its back as a protection, as its hind quarter is jellylike and very

Societe Tahiti d'Etudes



A Crab That Housed Its Hind Quarter in an Old Brass Thimble

soft. It usually obtains the required protection by killing a small shellfish and walking off with the shell.

STEALING WITH THE HEEL OF A SHOE

One of the most novel aids developed by the jewelry thief is a pad of soft leather fastened to the bottom of the



The Soft-Leather Heel Pad, Designed as an Aid in Stealing Jewelry

heel. When he or she, for both sexes are in the "game," nears the small object to be "lifted" it is knocked on the floor accidentally. If the "accident" is not noticed, the heel of the foot is placed on the object, the pressure of the foot sinking it into the soft pad, where it remains until a convenient time arrives for its removal to a safer place.

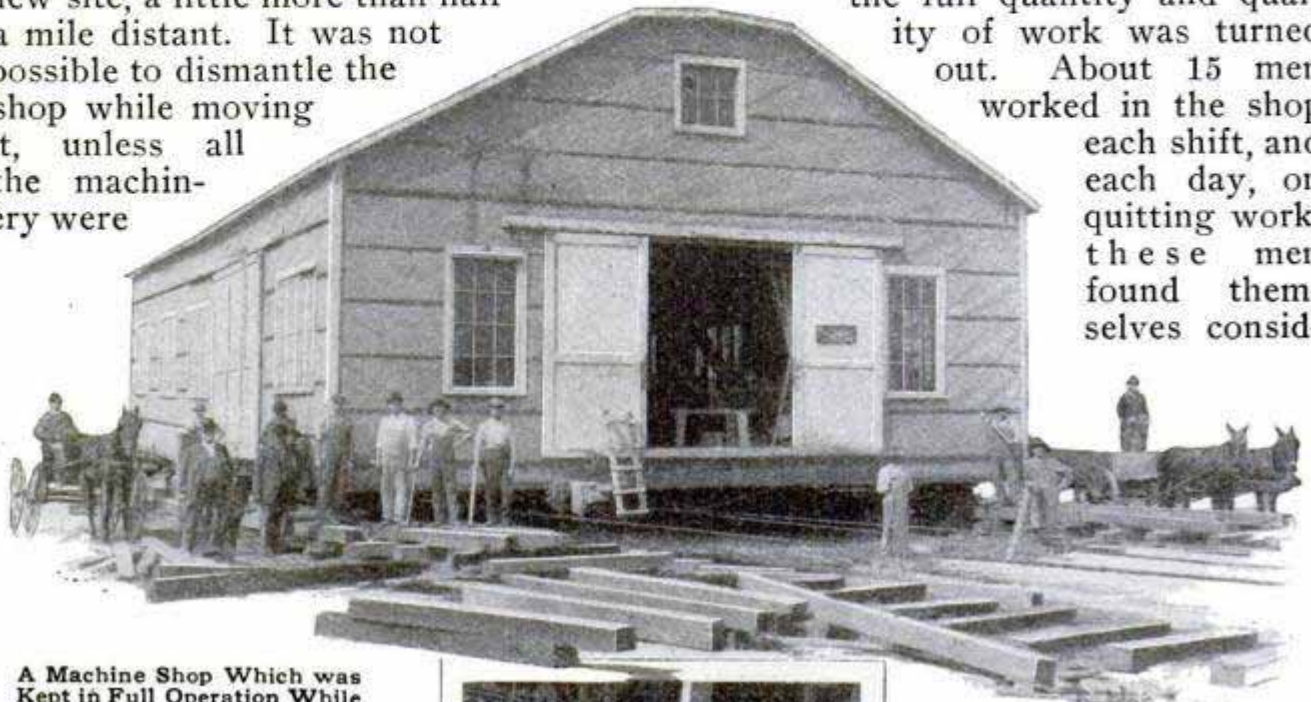
Nearly 50 tons of water had to be raised out of the mines of South Staffordshire, Eng., last year to every ton of mineral.

676

A "PERAMBULATING" MACHINE SHOP

A large machine-repair shop, 50 ft. wide by 80 ft. long, one of the units of a large factory, had to be moved to a new site, a little more than half a mile distant. It was not possible to dismantle the shop while moving it, unless all the machinery were

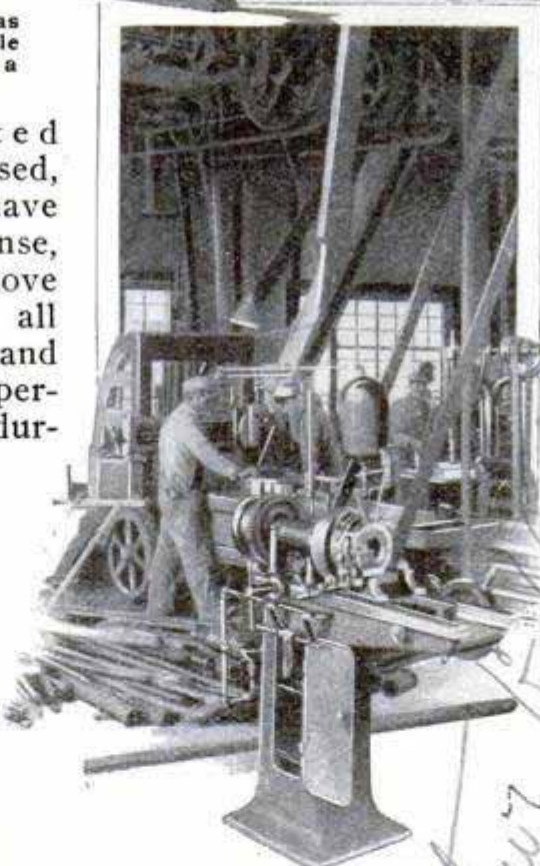
fields, but during the entire moving the machinery was kept running without intermission, day and night, and the full quantity and quality of work was turned out. About 15 men worked in the shop each shift, and each day, on quitting work, these men found themselves consid-



A Machine Shop Which was Kept in Full Operation While It was being Moved Half a Mile to a New Site

temporarily erected where it could be used, and, as this would have entailed a large expense, it was decided to move the structure with all machinery in place, and attempt, at least, to operate the machinery during the moving.

The plan was carried through without a hitch, due to the fact that all the machinery is driven by electric motors. The building was jacked up, loaded on two longitudinal timbers, one under each wall; long coils of line wire were connected up between the power supply and the electric motors, and the moving began. The moving operation took 10 days, and the building had to be drawn up and down hill, across railroad tracks, streets, and planted



Men at Work in the Machine Shop While It was Being Moved

erably nearer home than when they went to work.

769

AIR GUN STORES POWER FOR SIXTY SHOTS

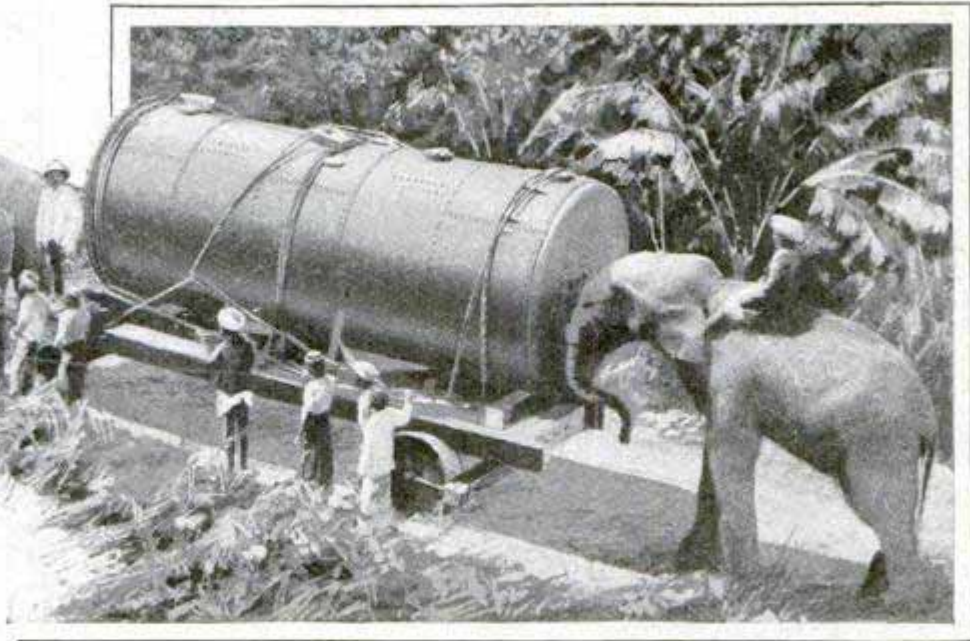
An air gun which can shoot 60 bullets before the air compressor need be recharged is soon to be placed on the market. By a clever system of valves, the air chamber, which is charged by a few strokes of a lever, becomes a miniature storehouse of energy, just a portion of which is used for each shot.

The little round bullets are fed from the ammunition tube to the breech by an automatic device which makes rapid discharge of the gun possible. The ammunition tube has a capacity of more than 60 bullets.

Scott Wash. 1910. Leuchter. V. Leuchter. W. Arthur.

690

Elephants
Hauling and
Pushing a Boiler
to a Tea Estate in
the Interior of Ceylon



ELEPHANTS HAUL BOILER THROUGH JUNGLE

The transportation of heavy articles into the interior of Ceylon is usually accomplished by means of elephants, an excellent example of the procedure being shown in the accompanying illustration. The large boiler was transported through the jungle to a tea estate, four elephants drawing the heavy truck on which it was loaded, and a fifth pushing with its head against the rear end of the boiler where the road grade was steep.

MOTOR MAIL COLLECTING MADE EASY

Two inventions of a physician of Washington, D. C., which will revolutionize the mail collections in cities and net a great saving to the postal service in both time and money, have been adopted by the postoffice department. These devices include a new drop-bottom street mail box and collection motorcycle.

With the installment of this new system, the city carrier will not have to stop the machinery of his motorcycle or dismount to make collections from boxes. The three-wheeled motorcycle is equipped with a 5-hp. engine and carries a big bin in front. The collector retains his seat, works a lever which drops or opens the bin,

then turns the lock in the letter box, the bottom of which drops at an angle of 45 deg., forming a chute which sends the entire contents of the box into the bin of the collecting motorcycle without handling.

A turn of a lever locks the mail receptacle on the motorcycle, and the closing of the mail box operates a mechanical device which indicates the day, hour and minute of the collection.

By the adoption of these devices city mails will hereafter be more quickly



New Mail-Collection
Device, the Letter Box
Forming a Chute into
the Collector's
Motorcycle Box

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collected and an absolute check on the carriers as to the exact time of collections will be had.

FREIGHT TRANSPORTATION IN ALASKA

1726 The transportation of freight into the country around Nome, Alaska, is carried on with considerable difficulty in both summer and winter. In winter, of course, it is a problem of snow, and sleds are used, some of which are drawn by horses as well as dogs. In the illustration of winter transportation, the forward or lead sled is carrying a load of three tons.

The big-



Horses Drawing Heavily Loaded Sleds in Alaska

wheeled "spider" shown in the other illustration is used for hauling heavy pieces of machinery across the marshy country around Nome in the summer time. This vehicle, which carries its load swung under the rear axle, has a capacity of 25 tons. The rear wheels are 8 ft. in diameter, and have a rim 2 ft. wide. The axle is 4 in. in diameter. The ground in the vicinity of Nome is so soft and spongy that a narrow-wheeled wagon would break through the surface, but this spider rolls over leaving scarcely a mark and is comparatively easy to draw. The small front wheels carry practically no weight.

NEW LAST-RESORT METHOD OF RESUSCITATION

A method has recently been devised by Dr. Joseph Erlanger, of artificially producing normal heartbeats by applying electrical stimulus directly to the fibers in which the heart impulse originates.

This treatment may be employed after other methods of resuscitation have failed, or it may be used in connection with massage and other measures. It consists in passing a tube-like electrode, attached to the positive pole of the battery, through a small incision between the third and fourth ribs close to the left side of the breastbone, and applying it directly to the portion of the heart above referred to, while the other electrode is placed



A "Spider" Used for Transporting Heavy Machinery in the Vicinity of Nome

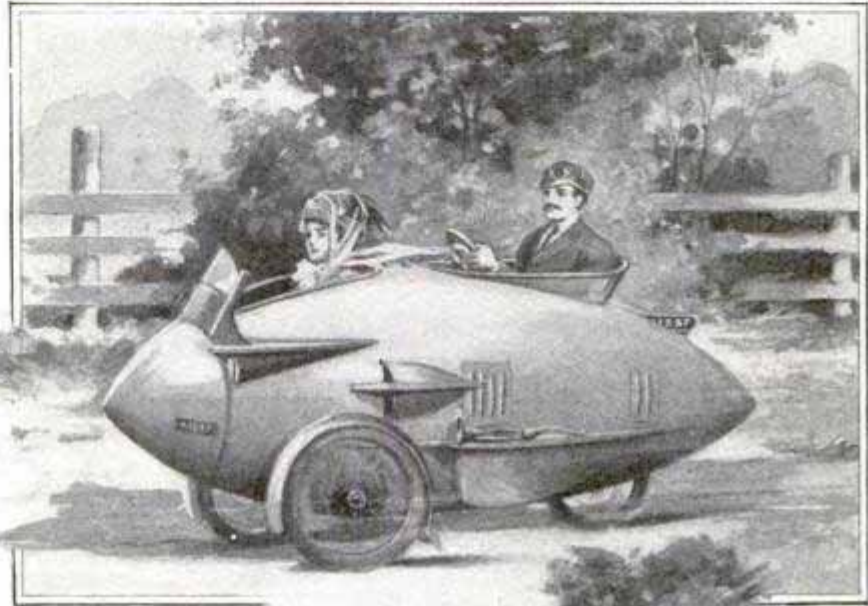
wherever convenient on the body. This starts the contractions in the two upper chambers and stimulates the action of the two lower ones, until soon the whole heart is beating, and revival occurs.

It may be said, with some reason and not irreverently, that this method in connection with artificial ventilation of the lungs by passing a steady stream of air into them through a rubber tube in the windpipe, by which a

person may be kept alive for hours without a motion of breathing on his part, almost amounts to raising the dead.

FULL ELECTRIC SERVICE IN TOWN OF THREE HUNDRED

A 24-hour electric service in a town of only 300 residents is what the little community of Perry, Kas., prides itself upon. The current is obtained from a 17-kw. oil-engine-driven generator, and, as the maximum transmission distance is only 1,300 ft., a 125-volt two-wire direct-current system is used for distribution. The 30-hp. engine uses kerosene for fuel, and is run during the five hours of the night when the load is heaviest. During the rest of the 24 hours storage batteries are drawn on for energy. Energy is furnished 41 customers, including a motion-picture show.



The Freak Motor Car That Caused London Experts to Experience a Shock

AEROPLANE REPORTS WAR MOVES BY WIRELESS

During recent military maneuvers in France a wireless outfit was fitted to a Farman biplane and reports of the movements of troops were constantly sent to General Gallieni by this means. The following messages are some of those sent to headquarters from the air:

8 a. m. Noyant.—A battery entrenched, a group leaves on Noyant road. 8:05 a. m.—Hostile aviation park on the border of the Maure-Sépures road. 8:07 a. m.—La Celles-Saint-Avant. Nothing on the road since Saint Maure. 8:10 a. m.—Port-de-Piles. An infantry column, about a brigade, coming from Dange. 8:25 a. m.—A cavalry regiment passes Dange moving toward Port-de-Piles, upon the Dange-la-Hayes-Descartes road.

The Aeroplane 10/3/12

LONDON HAS THE PRIZE FREAK AUTOMOBILE

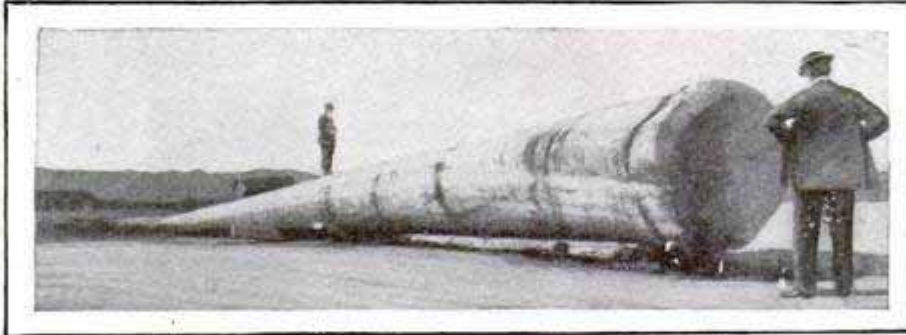
Motor-car experts of London have recently been given a shock from which they are slowly recovering. The cause of the disturbance was the appearance on the streets of the British metropolis of a car of the most freakish appearance. In shape it resembled a cross between a fish and a torpedo.

It had three wheels, carried one passenger who sat in front of the driver, and was facetiously described by its maker as having been designed to meet all the various conditions London has experienced during the past summer. So far as is known it was not the contention of the builder of the car that it represented any particular type of construction or was designed to accomplish any other purpose than head the long list of freaks that have put in their appearance since the horseless vehicle became popular.

ⒸAn electric searchlight of 72,000-candlepower intensity and a range of 5 nautical miles (about 5.8 statute miles) has been recently installed on the Hamburg-America liner "Kaiserin Augusta Viktoria" as an additional safeguard against collision with icebergs.

HUGE FLAGPOLE FOR EXPOSITION

59 A perfectly straight log of Douglas fir, 220 ft. long and 5 ft. in diameter at the butt, tapering evenly to a diame-



A 220-Ft. Douglas Fir to be Used as a Flagpole at the Panama-Pacific Exposition

ter of 2 ft. at the top, lies at the Panama-Pacific Exposition grounds waiting to be erected as the lower portion of what will probably be the biggest flagpole in the world. It was brought down the Pacific coast from Washington as part of one of the giant rafts of logs for which that section is noted.

691 FOUR-GUN TURRETS FOR FRENCH BATTLESHIPS

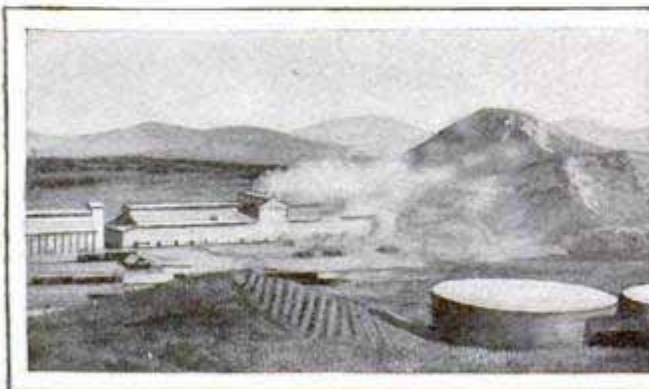
The new battleships of the French navy are to have three turrets, each of which is to mount four 12-in. guns. As these vessels will be the first to carry four guns to a turret, the experiment will be watched with considerable interest by the rest of Europe and also by the designers of the American battleships. The gun mountings will have to be of extraordinary weight, and

there are other difficulties to be met, but if the four-gun turret proves a success, the smashing power of a comparatively short ship with three such turrets mounted on the middle line, will be enormous, as this would make all 12 big guns available for every broadside.

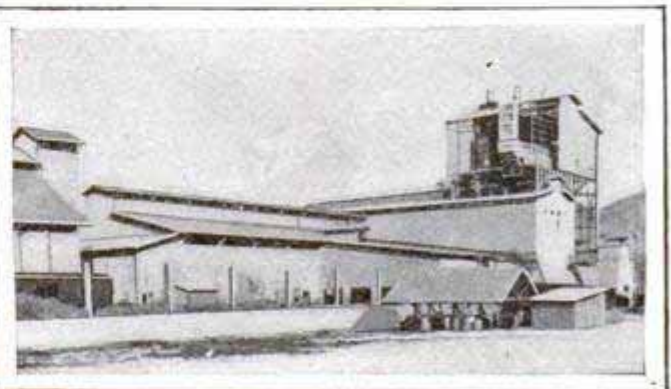
SETTLING CEMENT DUST BY ELECTRICITY

The cement-making industry is growing so rapidly that any improvements in its method of manufacture are very important. Of particular interest to this industry during the past few years have been the objections arising to the dust which is given off from the great cement kilns and spreads over the surrounding country. In southern California, two enormous cement plants have been forced to find some means of preventing the escape of this

dust, since the farmers in the vicinity claimed that their orange and lemon groves were being ruined, and this problem thus became extremely important. Each of the great kilns used at these plants gives off nearly a billion cubic feet of gas per day, and thus carries four or five tons of dust out into the atmosphere. Since there are ten kilns, it will be seen that a very large amount of dust would be thrown out. The difficulty in getting the dust



View of Dust Cloud over Cement Factory before Settling Apparatus was Installed



Same Factory with Apparatus for Settling Dust by Electricity in Operation

out of these gases is caused not only by the enormous volume of gas, but also by its very high temperature (about 850 deg. F.). Recently, however, Walter A. Schmidt of Los Angeles has succeeded in precipitating all of this dust by passing an electric discharge through the hot gases, according to the method devised by Sir Oliver Lodge, for precipitating the dust from the smoke of smelters. Sir Oliver did not succeed in the practical application of his process, but it was made a commercial success by Dr. F. G. Cottrell.

By passing electricity through the gases at a high voltage (what is called a glow discharge) the particles of dust become charged with electricity, and are attracted to electrically charged plates of metal. The dust thus collected is cleaned off every three or four hours by a mechanical rapping or striking of the plates, the machinery being run by an electric motor.

The method is in itself very economical, and the cement companies may even find that they make money by being forced to collect the dust, for it has been found to be very valuable as a fertilizer, containing a large percentage of potash.

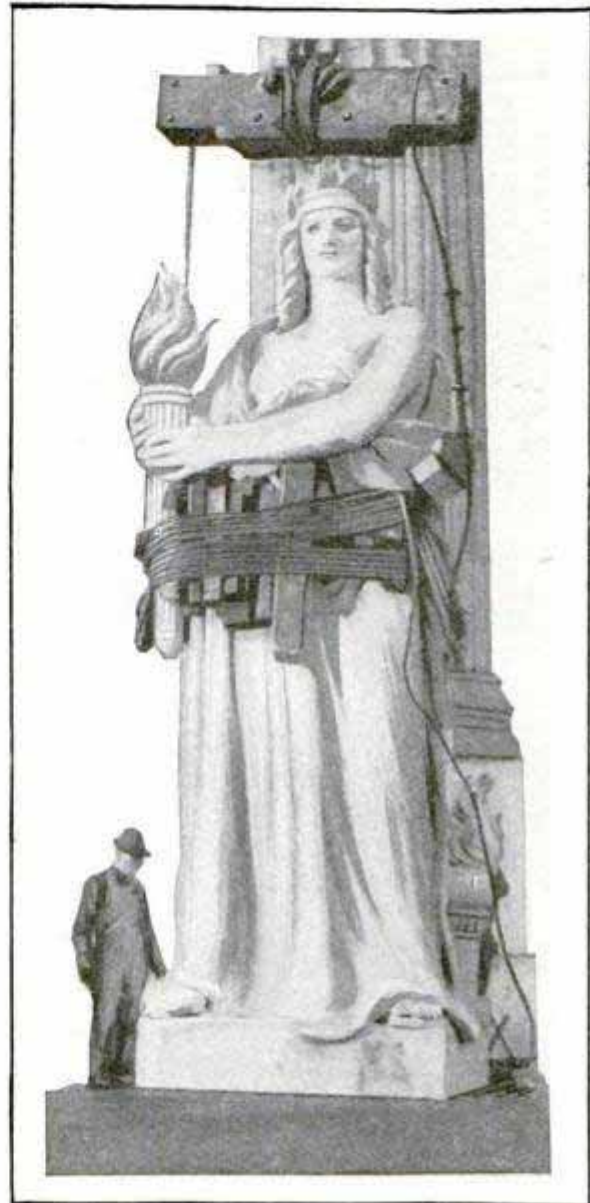
COLOSSAL STATUES CARVED FROM SINGLE BLOCKS

The first of the six mammoth statues which are to occupy positions above the entrance of the Union Station in Washington was hoisted into place recently. The statue is said to be among the largest in the world cut from a single block of stone. It is about 25 ft. high and weighs more than 25 tons.

The six statues represent the last work done by the late Augustus Saint-Gaudens, the famous sculptor. The one that was recently placed in position is symbolical of Truth. The other five are to represent Fire, Electricity, Old Mechanics' Arts, Freedom, and Imagination.

In order to hoist the statues into position the most massive derrick ever used in Washington was employed. The pedestals which the statues are to

occupy are nearly 60 ft. above the street level. The derrick is about 90 ft. high.



"Truth," by Saint-Gaudens, One of Six 25-Ft. Statues, Which are to Adorn Entrance of Union Station, at Washington, D. C.

The statues have been carved from blocks of Northfield, Vt., granite weighing 90 tons.

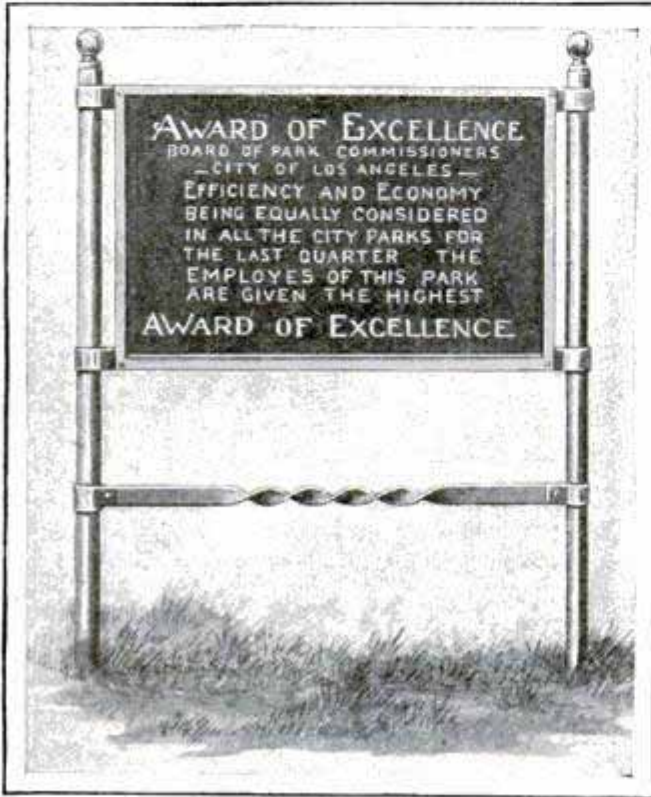
THE WATER CLAIMED TO BE SAFER THAN LAND OR AIR

The loss of life on oceans, lakes, bays and rivers, is, according to the ~~Marine~~ Journal, 50 per cent less than that on land conveyances. Attention is also drawn to the fact that, although submarine navigation is about as dangerous as the, to man, equally unnatural navigation of the air, the loss of life in the former has been considerably less, proportionally, than in the latter.

The 10/10/12

TROPHY OF MERIT FOR PARK EMPLOYEES

The park commissioners of Los Angeles allot a bronze tablet which stands



Tablet Awarded Every Three Months to the Employees of the Best Cared-For Park in Los Angeles

as an award of excellence in the park which was most efficiently cared for in the past quarter. This trophy has the dimensions of about 1½ by 2 ft. and is mounted on an ornamental support of iron. Every three months it is placed in the recreation ground which has shown the best results in the preceding 90 days, and in addition to this honor, the employees of that park receive a bonus of \$5 each. The system works for the betterment of the park service and is highly commended by the commission.

OLDEST BLAST FURNACE DISMANTLED

754 With the dismantling of the Cedar Point furnace, Port Henry, N. Y., what is believed to be the oldest original blast-furnace shell in operation in this country ended its period of usefulness. It was erected nearly 40 years ago, and was the first furnace to use the

Whitehall hot-blast stoves, which were imported at a cost of over \$100,000.

THE NEW SAFETY RULES FOR TRANSATLANTIC LINERS

765 The lesson of the "Titanic" disaster has borne fruit at last, at least as far as rules and regulations are concerned. The British Board of Trade has issued its new requirements. All foreign-going passenger steamers, emigrant ships, and foreign-going sailing ships carrying passengers must provide sufficient lifeboat accommodation for all on board. All lifeboats must be of prescribed build, and must be fitted with protective fenders. The term "lifeboat" includes the "deck lifeboat," but the collapsible lifeboat is no longer to be allowed. Existing collapsible boats, however, are to be allowed to count for a certain period, after which they must be replaced. A larger number of motorboats is to be allowed. The equipment for lifeboats is somewhat enlarged, and all of it must be in the boats when the ship leaves harbor. The number of persons to be carried must be marked on each boat. The rule now existing which gives permission to carry a lesser number of boats in the event of the ship being divided into efficient watertight compartments is abolished.

The new rules for life jackets and life buoys require that they must be suitably placed, and that at least half the life buoys must have ignition apparatus attached.

The date set for these rules to go into force was Jan. 1, 1913, but they are not to apply where they involve structural alterations to the ship until her next annual survey by the board.

Preliminary steps are being taken to deal with the question of improving the existing arrangements for reporting the movements of ice in the North Atlantic. The report concludes by expressing the hope that the question of steamship routes and the speed of steamships in the vicinity of ice will be the object of international discussion.

AVIATION NOW AS SAFE AS FOOTBALL

Commencing with the death of Lieut. Thos. E. Selfridge, at Ft. Myer, Va., on Sept. 17, 1908, and continuing down to Nov. 22, 1912, man's conquest of the air by engine-driven aeroplanes has been attended by 224 fatal accidents, in 23 of which a passenger as well as the pilot was killed.

In addition to the deaths caused by power machines, there have been five fatalities from glider experimentation—Otto Lilienthal, at Gross Lichterfeld, Germany, Sept. 21, 1896; Percy Sinclair Pilcher, at Rugby, England, Oct. 30, 1899; John Maloney, at Santa Clara, Cal., April 18, 1905; Eugene Speyer, at San Francisco, Cal., June 17, 1910, and Prof. John James Montgomery, in the Evergreen Hills, Cal., Oct. 31, 1911.

The annual division of the fatal accidents is, one in 1908, four in 1909, 30 in 1910, 77 in 1911, and 112 in 1912—up to Nov. 22.

For the figures following, the fatal accidents are the basis, on the theory that the death of the pilot is the essential part of the statistics, and deaths of passengers, while recorded in the separate list of deaths, are not properly included in a consideration of flight mileage per fatality.

The aggregate mileage of all flying

Austria, 100 Pilots, 1 in 20 Killed



Belgium, 100 Pilots, 1 in 25 Killed



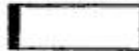
Russia, 200 Pilots, 1 in 17 Killed



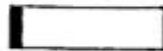
United States, 300 Pilots, 1 in 7 Killed



Italy, 300 Pilots, 1 in 20 Killed



England, 350 Pilots, 1 in 18 Killed



Germany, 1,500 Pilots, 1 in 28 Killed



France, 3,000 Pilots, 1 in 41 Killed



done throughout the world has been conservatively estimated as follows: during 1908, 1,000 miles; during 1909, 28,000 miles; during 1910, 600,000 miles; during 1911, 2,300,000 miles, and during 1912, 12,000,000 miles. It is not claimed that these figures are absolutely complete, but they include only carefully observed and definitely tabulated performances, so the inclusion of more complete data could only increase, rather than decrease them.

The number of airmen during each year, including all others as well as the licensed pilots, works out pretty closely to five in 1908; 50 in 1909; 500 in 1910; 1,500 in 1911, and 5,800 in 1912.

Now, making a few simple deductions from the foregoing data, it is easy to calculate that in 1908 there was a fatality for each thousand miles of flight; in 1909, one for each 7,000 miles; in 1910, one for each 20,000 miles; in 1911, one for each 30,000 miles, and, in 1912, one for each 107,000 miles. It is equally evident that in 1908, one in five of the airmen were killed; in 1909, one in 12; in 1910, one in 17; in 1911, one in 20, and in 1912, one in 51.

On the face of it, then, aviation has consistently and rapidly improved in safety from year to year, until now it is at least ten times as unlikely to kill a person engaged in it as it was in 1908. And in spite of this reduced danger per individual, there is a still greater reduction of danger per unit of mileage, 107,000 miles of flight being now accomplished with the same toll of human life that only four years ago was paid for each thousand miles.

Yet ninety-nine persons out of every hundred are impressed with the idea that aviation, which had killed less than half a dozen individuals four

Diagram of Fatal Accidents to Aviation Pilots in Four Years. The Long Strips Represent the Number of Pilots Flying, and the Black Sections at the Left Represent the Proportion of Pilots Killed

AVIATION DEATHS IN 1912

NAME	PLACE	DATE	MACHINE
— Ruchonnet	La Vidaméc, France	Jan. 12	Monoplane
— Wagner	Juvisy, France	Jan. 20	Biplane
Lieut. Boerner	Senlis, France	Jan. 21	
Rutherford Page	Los Angeles, Cal.	Jan. 22	Biplane
Lieut. Pomentonia	Pau, France	Feb. 2	
Capt. Le Maguet	Saint-Cyr, France	Feb. 4	
Albert Schmidt	Oberschonweide, Germany	Feb. 16	Biplane
Grahame Gilmour	Brooklands, England	Feb. 17	Monoplane
Lieut. Ducourneau	Pau, France	Feb. 23	Monoplane
— Fraschi	Turin, Italy	Mar. 3	
Mlle. Suzanne Bernard	Etampes, France	Mar. 10	Biplane
Lieut. Sevelle	Pau, France	Mar. 13	Monoplane
Gustave Witte	Teltow, Germany	Mar. 15	Biplane
Lieut. Bertoletti	Villola-Ticino, Italy	Mar. 15	Monoplane
Lieut. Albo Kaiwow } Mechanician }	Sebastopol, Russia	Mar. 23	
— Rost	Harburg, Germany	Mar. 25	
— Kleine	Dusseldorf, Germany	Mar. 26	
Capt. Jost	Villesauvage, France	Mar. 30	
— Schmidt	Johannisthal, Germany	Apr. 3	
Calbraith P. Rodgers	Long Beach, Cal.	Apr. 3	Biplane
Lieut. Boncour	Laimont, France	Apr. 13	Monoplane
John Verrept	Versailles, France	Apr. 17	Monoplane
Lieut. Ville-d'Avray	Verdun, France	Apr. 19	
— Hoestli	Johannisthal, Germany	May 1	
Count de Robillard	Nice, France	May 4	
Mlle. Galanschkee	Riga, Russia	May 5	
— Olbrechts	Saint-Job, Belgium	May 6	
— Pachmeyer	Johannisthal, Germany	May 7	
Lieut. Depersis	Pordenone, Italy	May 10	
— Schmigulski	Kassel, Germany	May 12	
Ray Wheeler	Kinlock Park, Mo.	May 13	
E. V. B. Fisher } Victor Mason }	Brooklands, England	May 13	Monoplane
Capt. Echeman	Etampes, France	May 14	Monoplane
Fred J. Southard	Osborn, Ohio	May 21	Biplane
— Hoff	San Francisco, Cal.	May 25	
Lieut. Von Schlichting	Johannisthal, Germany	May 25	
Harry Turner	Mineola, N. Y.	May	
Albert Buchstaetter } Lieut. Stille }	Bremen, Germany	June 1	
Philip Parmelee	North Yakima, Wash.	June 1	
Edward Reby	Juvisy, France	June 1	
Levasseur	Champagne, France	June 8	
— Kimmerling } — Tonnet }	Mourmelon, France	June 9	Monoplane
Lieut. L. W. Hazelhurst } A. L. Welch }	College Park, Md.	June 11	Biplane
Julia Clark	Springfield, Ill.	June 17	
— Yamish } — Leon }	Sebastopol, Russia	June 19	
Capt. Dubois } Lieut. Albert Peignian }	Douai, France	June 19	Biplane
Lieut. von Falkenhayn	Doberitz, Germany	June 19	Monoplane
Engineer Schlegel	Gotha, Germany	June 24	
Lieut. Etienne	Guyancourt, France	June 25	
Lieut. Schadt	Muhlhausen, Germany	June 28	
Capt. Bayo	Madrid, Spain	July 1	
Benno Koenig	Langenfeld, Germany	July 1	
Harriet Quimby } A. P. Willard }	Boston, Mass.	July 1	Monoplane
M. Pecker	Mourmelon, France	July 2	
Lieut. Cavanda	Bucharest, Roumania	July 5	Biplane
Capt. Loraine } Sergt. Wilson }	Stonehenge, England	July 5	
René Bedel	Mourmelon, France	July 9	Monoplane
Victor Morris Smith	Ravenswood, Cal.	July 13	
Gaston-Fernand Oliveres	Bourges, France	July 15	Biplane
Lieut. Zakotsky	Sebastopol, Russia	July 16	
Lieut. Preusser	Leipzig, Germany	July 18	
— Hansen	Norway	July 20	Monoplane
— Fischer } — Kugler }	Munich, Germany	July 27	
Sergeant Lachmann	Doberitz, Germany	July 30	
Lindsay Campbell	Byfleet, England	Aug. 3	Monoplane
Gottlieb Rost	Hamburg, Germany	Aug. 12	

NAME	PLACE	DATE	MACHINE
— Toth	France	Aug. 12	
W. Fenwick	Salisbury, England	Aug. 13	Monoplane
Lieut. Manzini	Tripoli, Africa	Aug. 24	
Fung Guey	Canton, China	Aug. 25	
L. F. M. Chandenier	Crecy-sur-Serre, France	Aug. 28	Biplane
Lieut. Garino	Vercelli, Italy	Sept. 1	
Lieut. Steger	Oberwiesenfeld, Bavaria	Sept. 6	Biplane
Capt. Patrick Hamilton } A. Wyness Stuart }	Hitchens, England	Sept. 6	Monoplane
E. H. Hotchkiss } C. A. Beddington }	Woolvercote, England	Sept. 10	
Alexander Karamanlaki	Gulf of Corinth, Greece	Sept. 11	Monoplane
Lieut. Siebert	Dresden, Germany	Sept. 11	Monoplane
Wm. B. Chambers	Greene, N. Y.	Sept. 11	
Paul Peck	Chicago, Ill.	Sept. 12	Biplane
Alexander Borie	Bornhem, Belgium	Sept. 13	
Howard Gill	Chicago, Ill.	Sept. 15	Biplane
— Lanciano	Italy	Sept. 15	
— Wenzel	Wiener-Neustadt, Austria	Sept. 18	
Russell Blair	Shenandoah, Iowa	Sept. 20	
H. D. J. Astley	Belfast, Ireland	Sept. 21	
Lieut. Berger } Lieut. Junghans }	Freiburg, Germany	Sept. 21	Monoplane
Lieut. Thomas	Bar-le-Duc, France	Sept. 25	
Lieut. Reggadoni	Mirafiori, Italy	Sept. 25	
Capt. Bambaugh	North Manchester, Ind.	Sept. 27	Biplane
Lewis C. Rockwell } Frank S. Scott }	College Park, Md.	Sept. 28	
John J. Longstaff	Hempstead, N. Y.	Sept. 28	Biplane
Geo. Underwood	Berrier, Mo.	Sept. 30	
Lieut. Wm. Hofer	Tannenburg, Germany	Oct. 1	
Chas. F. Walsh	Trenton, N. J.	Oct. 3	Biplane
— Happe	Buc, France	Oct. 3	
August Birkmaier	Hanover, Germany	Oct. 4	Monoplane
Ernest Alig }	Johannisthal, Germany	Oct. 6	Monoplane
— Libau }			
Mahohisa Kondo	Savona, N. Y.	Oct. 6	Biplane
Mechanician	Malpensa, Italy	Oct. 7	
— Visseur	Betheny, France	Oct. 10	
Alexander Takacs	Rekos, Austria	Oct. 14	
Henri Cobbioni } M. Bippert }	Chaux-de-Fonds, Switzerland	Oct. 15	
Maurice Blanc	Chalons, France	Oct. 17	Monoplane
Lieut. Weissbarth } Lieut. Lang }	Giengen, Germany	Oct. 19	
Amedée Lacour	Massidant, France	Oct. 20	
Louis Mitchell	Montgomery, Ala.	Oct. 23	Biplane
Russian Officer	Tarnow, Austria	Oct. 26	
— Siebert	Germany	Oct. 30	
Moritz Hamburger	Oberwiesenfeld, Germany	Oct. 30	
Lieut. Poutrin	France	Oct. 31	
Nicholas Popoff	Adrianople, Turkey	Nov. 7	
André Frey	Reims, France	Nov. 22	

years ago, has grown into something terribly dangerous, when, as a matter of fact, aviation commenced as something very hazardous and has developed already into something fully 99 per cent less risky, until now a flight in an aeroplane is far safer than a ride in a racing automobile, and is only about as hazardous as participation in a football game, which, for numbers and time of individuals engaged, rolls up substantially an equal fatality list.

Much might be urged concerning the relative importance to human progress of aviation and football, but this

may be left to the impartial reader, despite the frequent newspaper standpoint, which plays up the spectacular aviation fatality and subordinates the commonplace football mishap, until a wholly wrong impression is produced.

Much also is to be said concerning preventable deaths of airmen. The most striking insight into this phase of the matter is probably to be gained from a comparison of the deaths in the eight principal countries, in which over nine-tenths of all the aviation accidents have occurred. From this comparison it is learned that, in Aus-

tria, with 100 pilots, there have been five deaths, or one in 20; in Belgium, with 100 pilots, four deaths or one in 25; in Russia, with 200 pilots, 12 deaths, one in 17; in the United States, with 300 pilots, 43 deaths, one in 7; in Italy, with 300 pilots, 15 deaths, one in 20; in England, with 350 pilots, 20 deaths, one in 18; in Germany, with 1,500 pilots, 54 deaths, one in 28; and in France, with 3,000 pilots, only 73 deaths, or one in 41.

The criminally bad showing of the United States, with a fatality rate still almost as high as when aviation was pure experimentation, instead of a well-formulated engineering science,

is unquestionably to be ascribed to the policy prevailing in this country, of leaving flight development so much in the hands of untrained club members, showmen, and reckless youths, instead of organizing it under the direction of engineers and scientists, as is done in France and Germany. That the distinction of the United States in this connection is even more unenviable than might otherwise appear, is to be inferred from the fact that, in addition to the excessive proportion of American airmen who have been killed, the American flight mileage per airman is away below the average of the important European countries.



The Steeplejack Resting upon the Top of the 600-Ft. Wireless Tower
On the Right—Steeplejack Perched on the Top of the Flagstaff
of the Highest Tower, 635 Ft. above the Ground

FAR-FLUNG MESSAGES OF GOVERNMENT WIRELESS

Exceptional power has been shown by the great government wireless station erected at Arlington, Va., just across the Potomac from Washington, and but recently placed in operation. The honor of catching the first wireless message flashed across the continent from this station belongs to operator Anderson, in charge of the Mare Island wireless station. The distance is in the neighborhood of 3,000 miles. A few nights later, messages were exchanged between the Arlington station

and the station at Point Loma, Cal., a distance across country of approximately 3,500 miles. The signals are usually distinct.

The Arlington station consists of three towers, arranged in an isosceles triangle, erected on a hill which rises 250 ft. above Washington. The tower forming the apex of the triangle is 600 ft. in height, and the two others 450 ft. high. In the illustrations is shown a steeplejack who was employed to paint the flagstaves of the towers.

Electrical World
4/2/11
540

COMMENT AND REVIEW

THE most interesting school I ever visited was on board an American battleship—the “Massachusetts.” Not that this particular vessel is different in this respect from her sisters in the

*Fine
Example of
Concentration*

battle fleet, for she is not. The time was last summer, when the midshipmen from the Naval Academy were afloat on various craft. On the quarter deck, protected by generous awnings and with a cool sea breeze blowing, were groups of young men, each in charge of an instructor. The men sat upon the deck, forming a circle around their officer, who lectured beside a blackboard on which he illustrated or to which he hung printed charts and maps. Every man had his note book, in which he made frequent entries. Other groups were going through flag practice and wigwagging. Meanwhile puffing steam launches were constantly landing and departing from the ship's side, and officers and men on leave were coming and going. Something was doing all the time, but so far as the students were concerned they would apparently have been no more isolated had they been at the North Pole or on some uninhabited island. The interest and energy with which they entered into their study was surprising to a landsman.

To the officer who was conducting me I remarked on the industry which these young men applied to their work, and mildly suggested that the average college student would not get very far under such distracting conditions. “Oh, that is nothing,” he replied, “come with me.” We started for what proved to be one of the mess rooms, from which came sounds quite like a county fair on a pleasant day. There were about 30 men there. Half that number were seated at a long table, each with his leather-covered note book, and sheets of paper on which problems were being worked out and transferred to the book. The problems were the real thing, involving algebra and geometry, the sort the land-lubber tackles in solitude and quiet. But these boys were working like race horses, and the results were entered with rapidity, but extreme neatness. They seemed to actually enjoy the doing of these hard things. I couldn't hear all the officer said, who stood close to me, for in one corner of the room, which would be considered small on land, was an upright piano. It was one of those able-bodied, reinforced instruments that one can hear when played by a young athlete in his shirt sleeves. And gathered about the piano were a dozen other muscular men of the same healthy build. The song was a spirited ragtime, with plenty of regularity, movement and volume — about 200 lb. to the square inch, I should

judge. Some of the singers not only sang, but as many as could find room also danced, which did not add to the solemnity of the occasion. I inquired if this strenuous occupation was compulsory. No, just some of the boys off duty enjoying themselves.

Meanwhile their companions at the mess table, absolutely oblivious, continued to work equations and various kinds of roots, and continued to transfer the results into the note books with that same regular, rapid and certain movement.

The great guns, the massive machinery, the enormous floating mass of iron—all are impressive. But most impressive of all was the wonderful self-control of these trained human machines, expressed in that one word “concentration.”



FOR long centuries the world dreamed of mastery of the air. Learned men had placed the stamp of impossibility on its accomplishment. For centuries success seemed most unpromising.

A
*Humiliating
Condition*

The educated and the unlearned scoffed together at the very idea. One day a strange whirring noise appeared. It was a new, peculiar sound, entirely unlike any other which man had ever heard. The nations looked on every side but found nothing to explain the mystery. Then they looked into the sky and saw for the first time the conqueror of the air.

And he was an American.

Scientists declared him the creator of one of the Seven Wonders of the Modern World.

For a time the nations waited for the great people whose nationality he bore to go on and develop this fledgling discovery. They naturally expected men who had invented telegraphs, harvesters, cotton gins and ocean cables, electric lights and phonographs, telephones and skyscrapers, and all manner of wonderful machines to annihilate distance and lessen the drudgery of the toiler, to develop and perfect this newest machine that laughed at gravity and called upon the wind to follow. For a brief time only they waited, and then set desperately at work to surpass us. As their study of the problem progressed it became evident that it was a science, and ultimate success could be attained only through scientific methods. But the highest universities were fellow students also and could not teach what they themselves had yet to learn. Special laboratories in which to experiment and then test the experiment were imperative. And there were no laboratories. Then the French people said among themselves, “We must have such institutions,”

but their government, like our own, did not hear the call. Determined that the new art should not languish, the French people opened their purses and a million dollars poured into the fund, which provided the first opportunity for scientific study. And the inevitable result followed:—France today leads the world in aviation.

Later, the French government took up the work it should have assumed earlier, and all their airmen can test their ideas to a satisfactory conclusion. Other governments, including Japan, Germany, England and Italy, have recognized the importance of keeping abreast of the times, and are spending large sums annually on this branch of the service.

And so we trail behind, while America, the birthplace of Wilbur Wright, begrudges a pittance which is less than some backwoods congressman secures to dredge Muddy Creek.



A CERTAIN hardware store of my acquaintance is to all appearances a model of its kind. The stock is well selected and up-to-date; everything is in the best of order. The floors are clean and the show cases bright. You can walk through the aisles without colliding with sharp-edged tools or bundles of barbed wire. The owner is pleasant and accommodating, and so are his clerks, yet the store has lost one regular customer and this is how it happened. A customer was entering the place when a man crowded past in the doorway, carrying in his arms what appeared to be a wooden soap box filled with large yellow candles. No second glance was needed to realize that it was what is called "powder" by the initiated, and known to the rest of us as dynamite. However, the worst was to happen. The customer passed in and stepping up to the counter was about to give his order when he noticed the clerk throwing some of the same yellow candles into a box. "Isn't that dynamite?" he inquired. "Yes," cheerfully answered the clerk. "Don't you think you are a bit reckless having it around like this?" "Oh, no," was the ready assurance, "this can't explode," and lest his statement might be doubted he gave the counter a couple of vicious whacks with the stick he had in his hand. The clerk seized another stick and was about to make a drum of the counter when my friend assured him no further demonstration was necessary. It really seemed unwise to question the word of a man who wanted to drive nails with dynamite.

*One Way
to
Lose Trade*

As the customer beat a hasty retreat the clerk called out to

learn what he wanted, and the answer was, "I want to get out of here," which he did and never came back. Now as a matter of fact, what the clerk did was supposed to be a perfectly safe thing to do, but the customer could not forget visions of tons of solid rock hurled high into the air while the earth trembled far around. The shock he received was not the same kind, but it kept him out of that store ever after. Other dealers and firms have similar smart young men, who as thoughtlessly, in other ways, are accomplishing the same result for their employers, quite as effectively as though they pounded nails with dynamite sticks.



THERE is immediate need for state laws providing severe penalties for stealing automobiles and motorboats. Even the cheapest car or boat represents a cost of several hundred dollars, and the average car would certainly be in excess of \$1,500. In many states, however, the penalty for stealing a valuable car is only a fine and that a ridiculously small amount. In every state the penalty for stealing a horse, worth perhaps \$100, runs from one to ten years in the penitentiary, while in some states the penalty for stealing a \$5,000 automobile is a fine not to exceed \$35. Owing to the large number of cars of the same make, size and color in every city, the thief is able to make the object of his theft the vehicle for his escape with it. It will carry him hundreds of miles at high speed in only a day or two. The absence of distinguishing features, such as characterize a horse, and the ease of substituting the license tag of one state for another, combine to make detection extremely difficult.

*Auto Theft
a
Farce*

In the case of motorboats the favorite method is to so change its appearance by a coat of paint, which can be applied in an hour, that its owner could not recognize it at a short distance. In Ohio a bill will be introduced making the penalty for convicted theft of a motor vehicle, valued at \$35 or more, imprisonment for not less than one year nor more than seven years; for motor vehicles of less value than \$35, a fine not to exceed \$200 or imprisonment up to 30 days.

The measure should pass without delay, and such other states as have not already provided for this same condition should promptly do the same. The Ohio bill also provides a fine of \$25 for failure of the driver of any vehicle on public streets or highways to display lights between sunset and sunrise.

H. H. WINDSOR

EIGHTEEN TONS OF IRON LOST DAILY BY RUST

One large railway system suffers a loss of more than 18 tons of metal daily, due solely to the effect of rust. Thus far, the only known preventive is to keep the metal surface always covered with a suitable paint. Some idea of the costliness of this remedy, however, may be gained from the fact that it requires about \$10,000 annually to paint one large railway bridge alone. A typical case of this kind is the Brooklyn bridge, upon which a corps of painters are constantly employed, as the weather makes repainting of one end of this large structure necessary before the workers have reached the other. Although experiments have demonstrated that pure iron surrounded by oxygen does not rust, and that some acid, especially carbonic acid, is necessary for the production of rust, the secret of manufacturing rustless steel and iron remains to be discovered.

790

SCENES ATTENDING THE WAR IN THE BALKANS

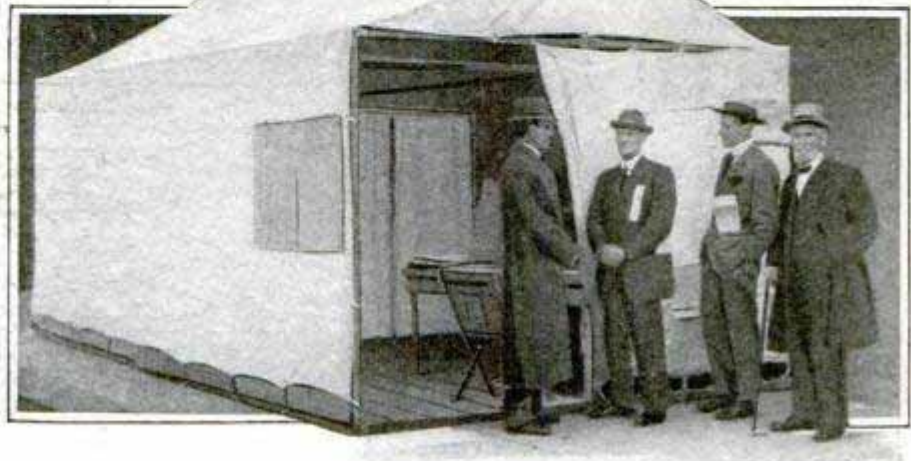
So far, two mechanical or scientific features stand out vividly in the great Balkan war. These have to do with the wonderful help given the Balkan army strategists by the military aeroplanes, and the remarkable effectiveness of the modern rapid-fire field guns of the allies, as compared with the poorer showing of the just as modern rapid-fire guns of the Turks, the supremacy of the one type of gun over the other being ascribed to structural differences. The field guns used by all the allies, with the exception of Montenegro, are the French Schneider-Creusots, while the Turkish guns are the German Krupps. This war is the first in which modern quick-firing

VOTING TENTS USED IN LOS ANGELES

734

Special voting tents, placed on the sidewalks or in vacant lots, were used extensively in Los Angeles in the last

Clean and Compact Tent Erected on a Sidewalk in Los Angeles as a Voting Place



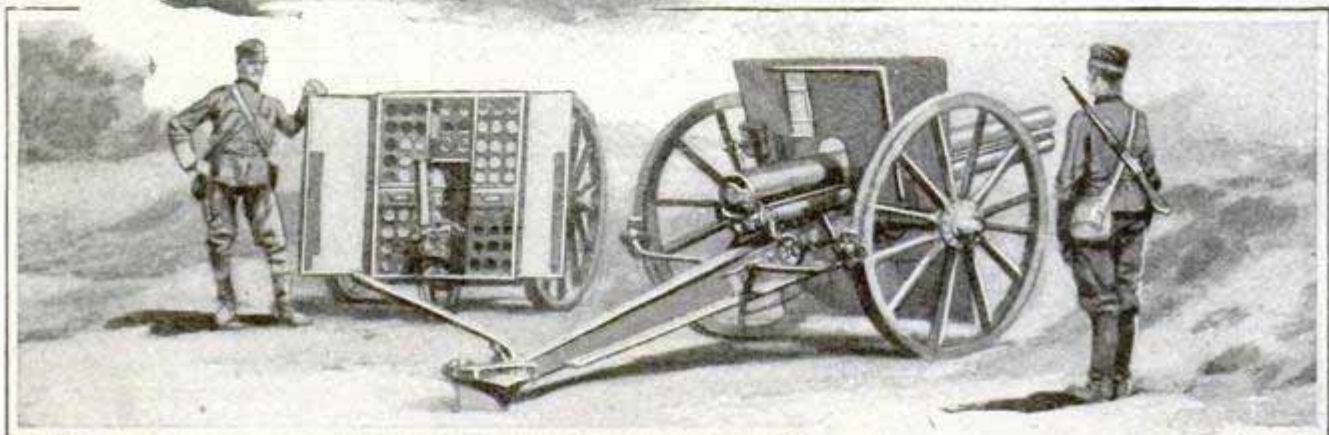
election. These tents save rentals and also provide clean, commodious quarters without interference from other business. The Australian voting booths inside the tents are also of canvas. The voting tent seems an excellent method of solving the problem of clean voting places, particularly in states where women vote.

guns have been used by both sides, and France is jubilant that the type of guns used by her own army has apparently proved superior to those of the Germans.

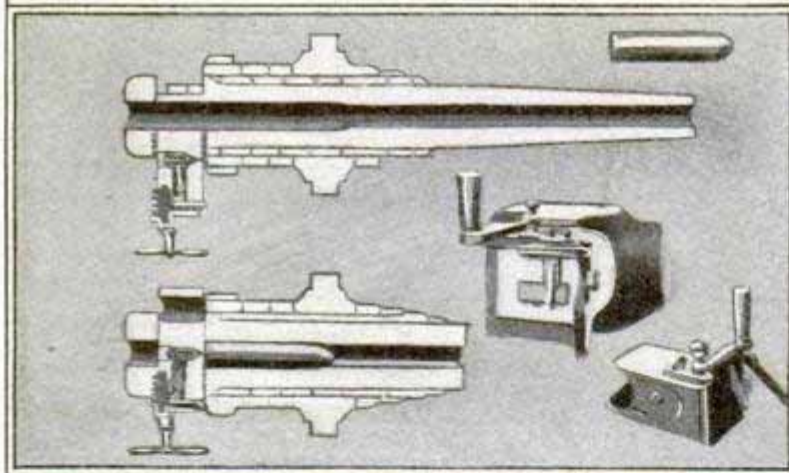
The breech of the Creusot gun opens at the back like a door, being hinged on one side. The Krupp gun, on the other hand, has a breech opened and closed by a wedge much resembling a bolt. The body of the gun at the base is slotted out at right angles to the bore, and the bolt or breechblock moves in this slot, and has a portion cut away to correspond with the bore of the gun, the shell being pushed through this opening past the wedge, which is then driven home.



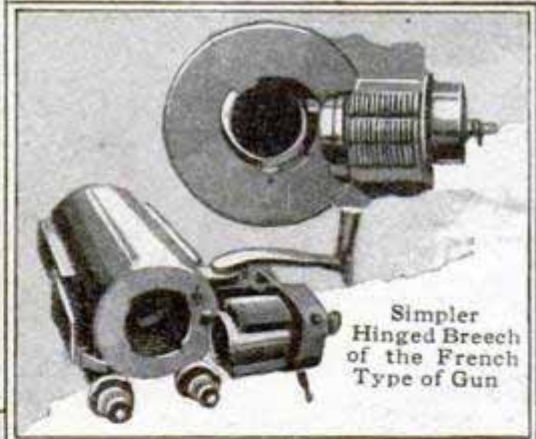
Umbrellas and Guns. Wild Malissores, Allies of Montenegro



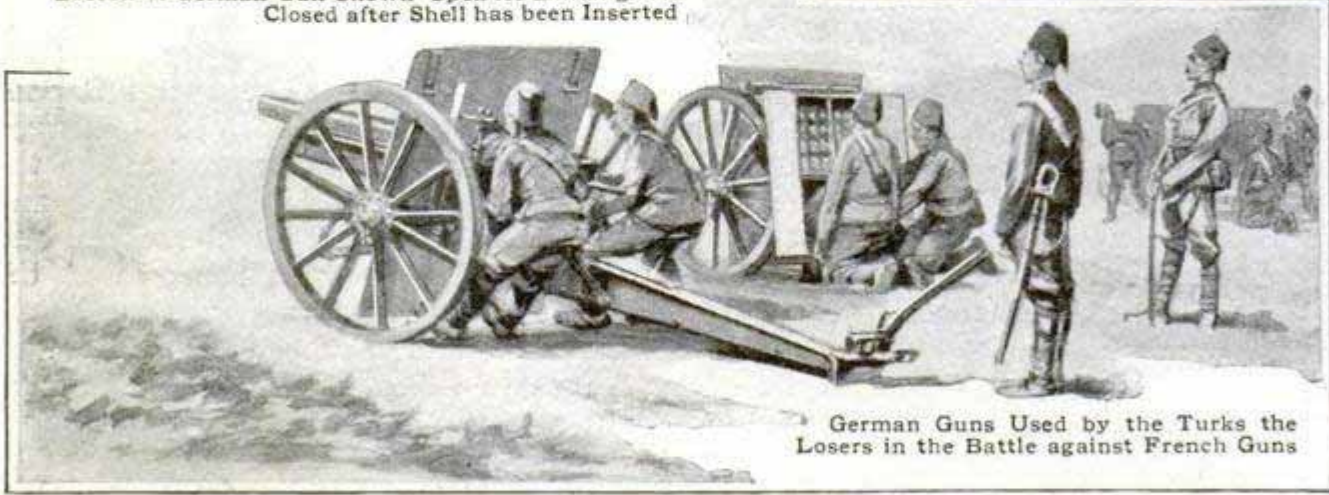
The French Guns so Effectively Used by the Balkan Allies



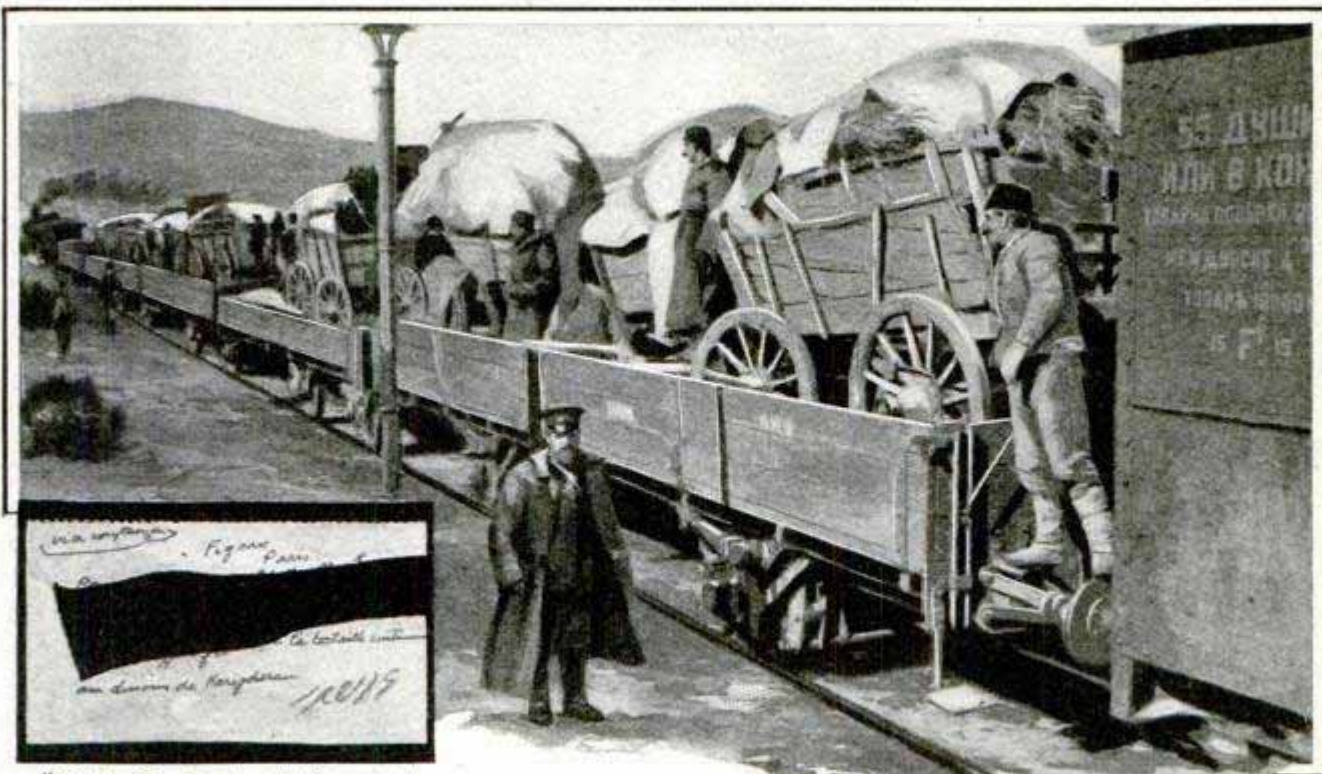
Breech of German Gun Shown Open for Loading and Closed after Shell has been Inserted



Simpler Hinged Breech of the French Type of Gun



German Guns Used by the Turks the Losers in the Battle against French Guns



"Battle Continuing:" Censored War Dispatch

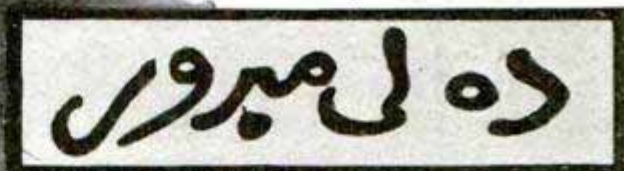
A Red Cross Train of Wagons and Supplies Arriving at Stara Zagora



Type of Monuments the Servian Peasantry Erect to Relatives Killed in Battle



Fragment of Bulgar War Song Translated into English



A War Correspondent's Badge in Turkish



War Correspondents with the Turkish Army. Note the Motor Side-Car Used by One of Them

Courtesy Sphere, London

STREAMLINE FORMS AND NOVEL ENGINES

By VICTOR LOUGHEED

From the standpoint of the aviation enthusiasts, the year's development of flight engineering, as epitomized in the aviation show just closed in Paris, is a subject for both criticism and congratulation.

Most striking in the way of prog-

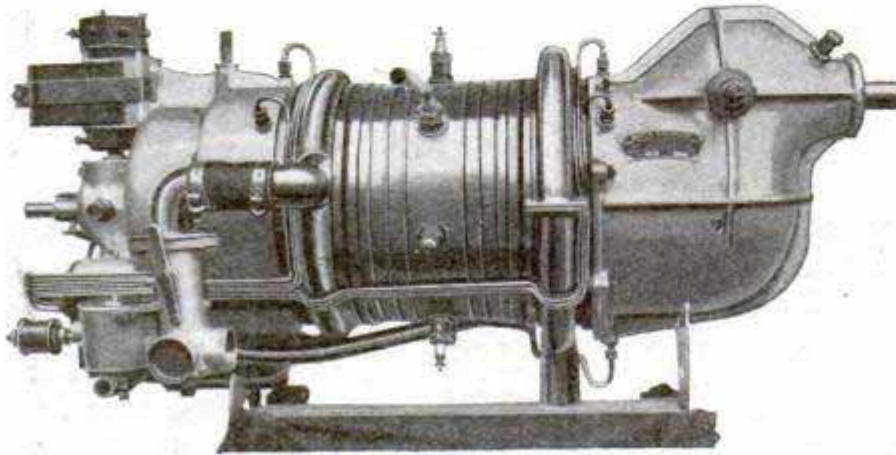
reason for the increased power of the modern aviation motor, which, however marvelously it may meet the demands made upon it, is unfortunately permitting, for the time being, the evasion of problems of efficiency, which, without it, would have to be solved.

As inexplicable as the disregard of other factors of efficiency is the lack of thought that seems to be given to the question of wing forms, for as long as designers are going to persist in the use of square-ended, uniform-section "planes," and similar monstrosities, so long will unsafe equilibrium, large sizes and small loadings,

and poor horsepower-weight ratios, be the rule, in place of the bird efficiency and safety that are ultimately probable.

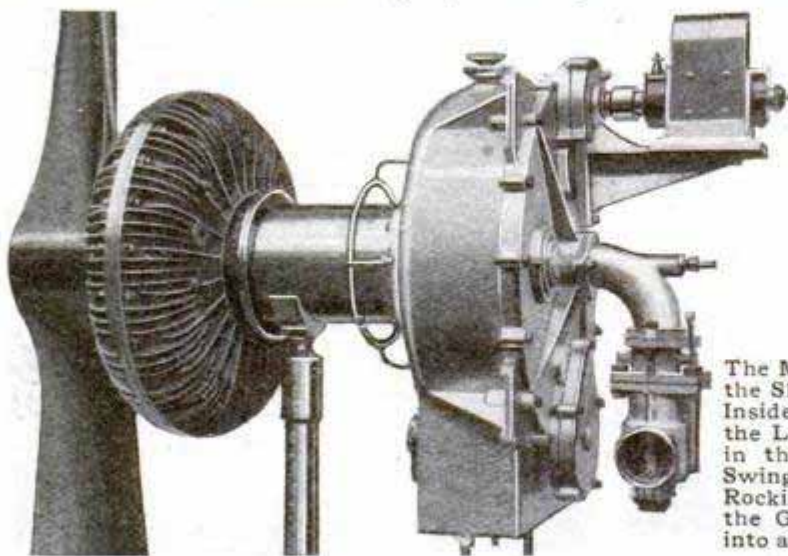
In the matter of structural details there is great improvement, and, barring the lack of girder depth, that is an inherent rather than an avoidable defect with the common types of wings, the best machines display a quality of material and workmanship that it will be hard to improve.

The hydro-aeroplane shows a great

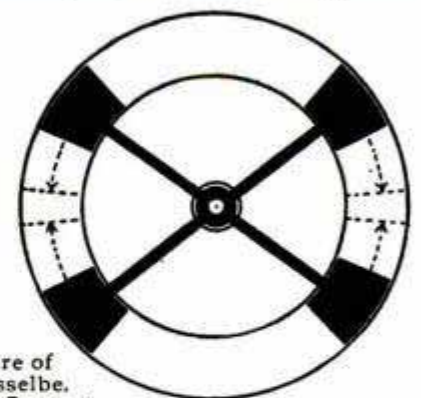


Salmson Motor of Revolver-Barrel Type, with Its Cylinders All Parallel in the Case

ress, perhaps, is the now settled trend toward the universal adoption of "streamline" body forms. Even Bleriot, for example, the pioneer French monoplane builder, and for long an advocate of openwork structures, has at last fallen in line with a characteristic example of the "monocoque." On the other hand, there is everywhere in evidence a singular indifference, even on the part of the foremost constructors, to the resistances set up by multiplied



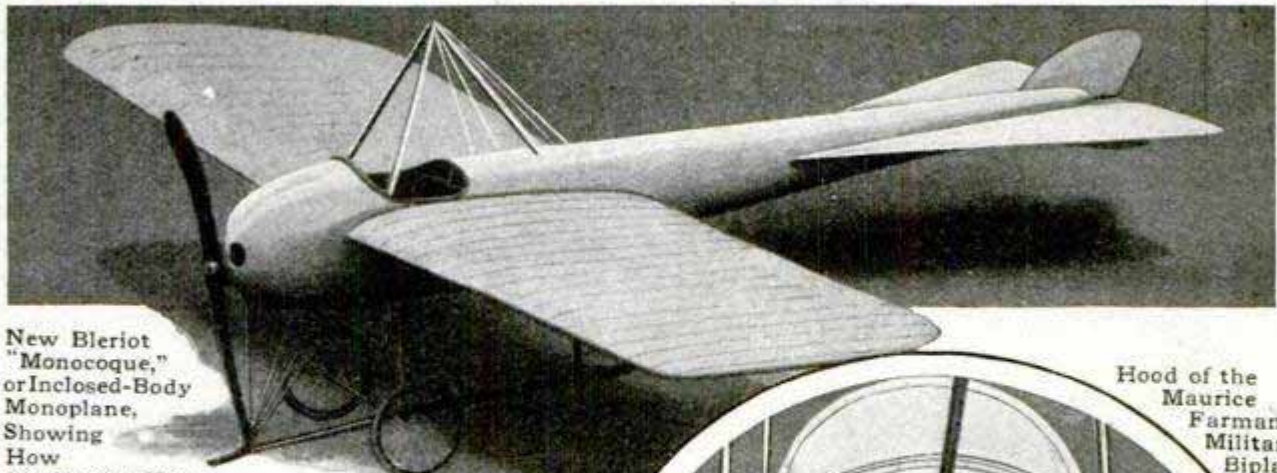
The Motor Feature of the Show, the Esselbe. Inside the Round Case at the Left are Two Arms Like a Letter X, as Shown in the Smaller Picture. Explosions Alternately Swing These Arms Together and Apart and This Rocking Motion is Transmitted along the Shaft to the Gear Case at the Right, Where Gears Turn It into a Rotary Motion



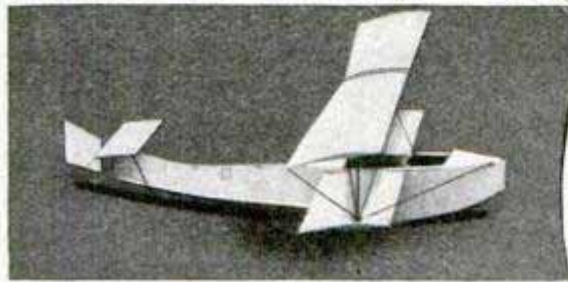
and complicated systems of stays, struts and running-gear elements, though these undoubtedly are a chief

increase in popularity, due, beyond a doubt, to its superior safety, and nearly every manufacturer displays one or

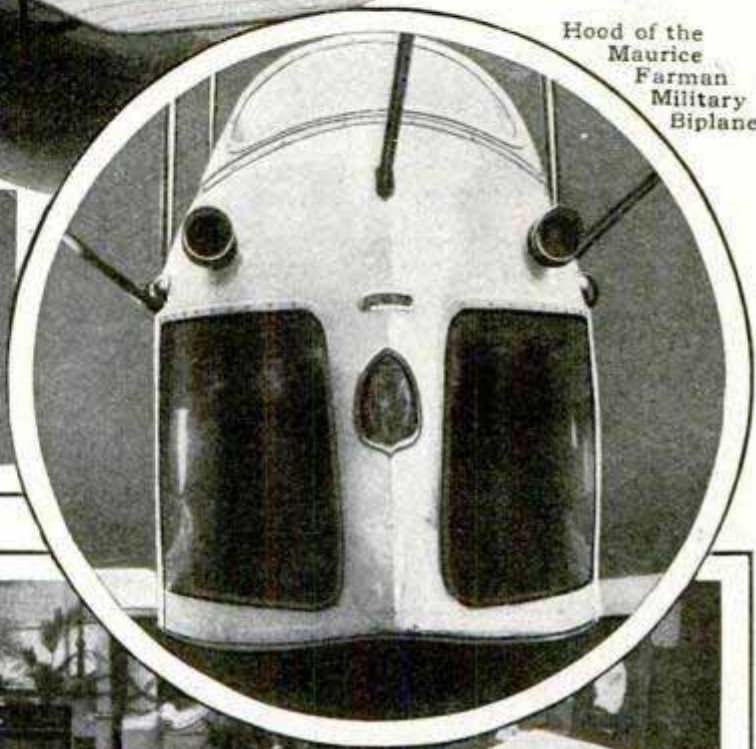
ARE PROGRESS MARKERS IN AVIATION SHOW



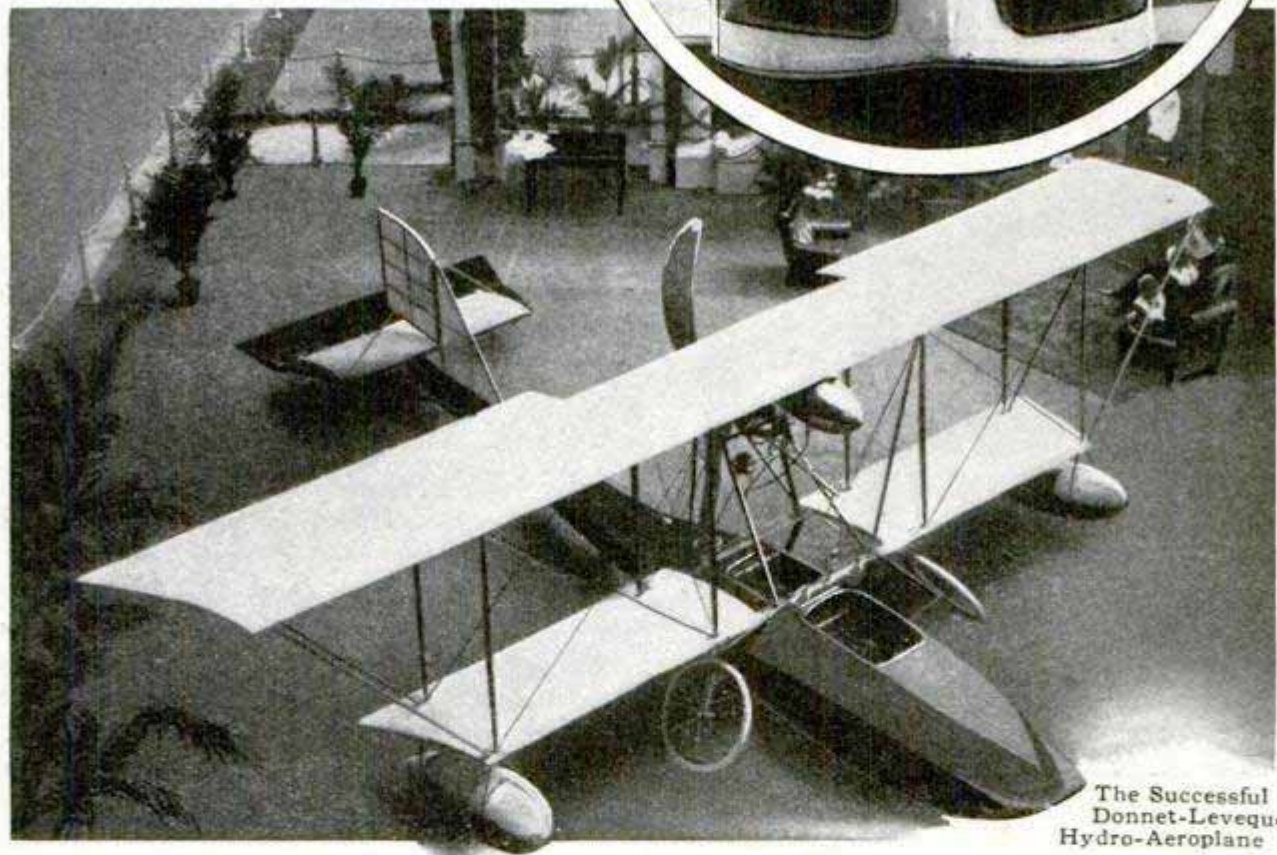
New Bleriot "Monocoque," or Inclosed-Body Monoplane, Showing How Bleriot has Now Adopted Streamline Form of Body



Fish-Shaped Body of the D'Artois Naval Hydro-Aeroplane



Hood of the Maurice Farman Military Biplane



The Successful Donnet-Leveque Hydro-Aeroplane

more examples. In the evolution of this type of vehicle, the policy of building substantially instead of flimsily, up from the water instead of down from the air, is becoming universal, with

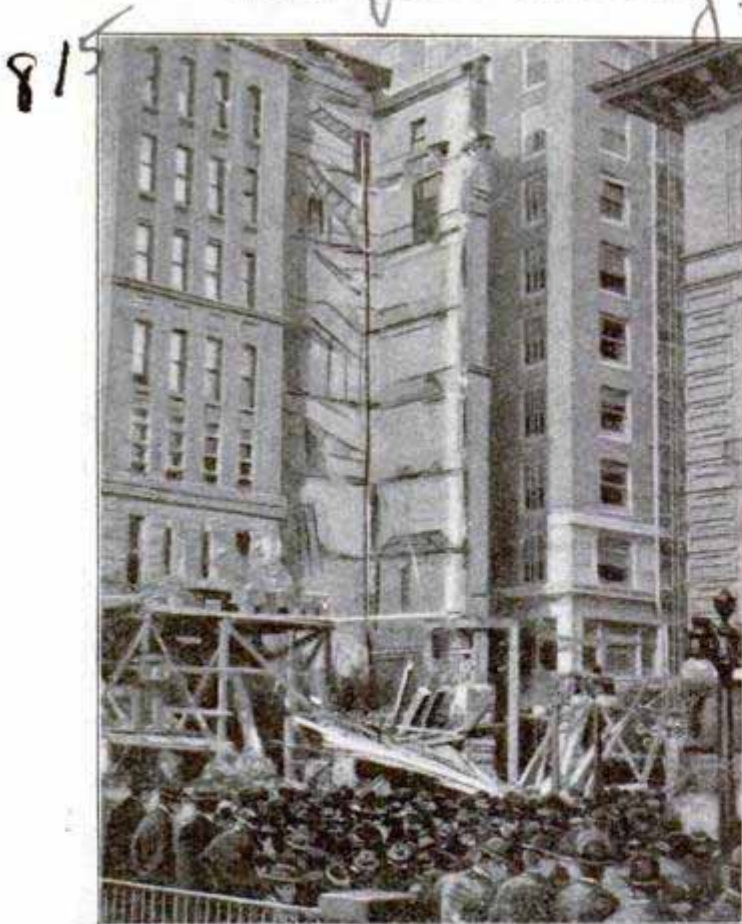
the result that the structures on float-terminated stilts manifestly lose by comparison with the more businesslike "flying boats," some of which are thoroughly seaworthy even in rough water.

Ever since the Gnome motor, by the application of clever innovations in design and an unprecedented quality in construction, proved the means of evolving a long-condemned type of freak gasoline engine into one of the most practical and valuable contributions that has been made to modern flight engineering, shrewd inventors have been industriously canvassing other old ideas in the hopes of discovering new merits. One of the most promising of these, realized into concrete and operative form, is the Esselbe, exhibited at the present aeronautical salon. In this new motor, which is pictured herewith, the essential feature consists of four pistons at the extremities of arms arranged like an articulated letter X, which swing alternately together and apart in a cylinder which revolves at constant speed, while the X-arms within it are back-gearred so as also to undergo a continuous rotary progression, at a slower rate. This curious and clever scheme enables the four spaces between the pistons to be simultaneously performing the four func-

tionings of a four-cycle motor—suction, compression, explosion, and exhaust—with the result that there are four explosions to each revolution, affording a considerable flywheel mass in combination with an impulse frequency the equivalent of that in an ordinary eight-cylinder motor. Further contributing to simplicity and reliability is the fact that only one spark plug is used, it firing the compressed charges as it passes them, one after another, by virtue of the higher speed of the cylinder as compared with that of the reciprocating parts. Cooling is said to be effective, vibration almost totally absent, and fuel and lubricant economy very high, while the weight of a model with a bore of 2.56 in., delivering 60 hp. at a speed of 1,200 revolutions a minute, is only 209 lb.—3½ lb. per horsepower.

Other novelties among the motors shown at the salon are the "parallel-cylinder," or "revolver-barrel" type Salmson engine, a number of new rotating motors of the Gnome type, and an 18-cyl., 180-hp., Rhone motor.

Marquam Olds



TEN-STORY OFFICE BUILDING COLLAPSES

This illustration shows what happened to a 10-story brick office and theater building in Portland, Oregon, when the wooden underpinning, used as a support while steel foundation columns were being placed, gave way.

The first crash came, luckily, at 4 o'clock in the morning, when none of the offices were occupied, a section of brick wall, 16 ft. wide, extending to the fifth floor, collapsing. Then, a few hours later, another larger section fell, ripping out floors and offices as it went crashing into the street. The only serious injury was to a woman who was trampled by the roped-off crowds when the second section fell.

☞ More patents are issued for beds than for any other article of household furniture, and most of them are for freak forms of beds in disguise.

THE GOVERNMENT AS AN EXPRESS COMPANY

The establishment of a parcel post in this country, which makes the post-office department a great express company in addition to its activities of the past, will work considerable change in the carrying equipment now used by rural carriers and star-route men. At present mail is

delivery cart and small automobile will prove inadequate in many dis-

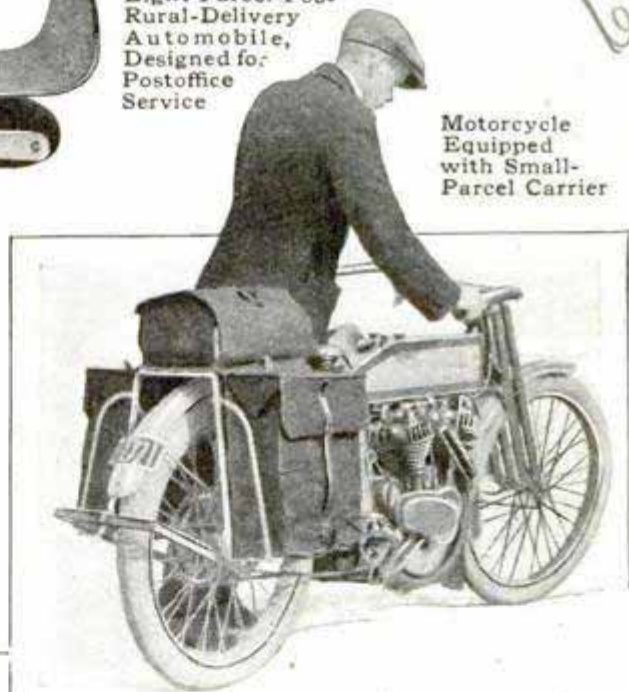


Automatic Computing Scale Bought by the Government for Parcel-Post Branch of the Large Postoffices

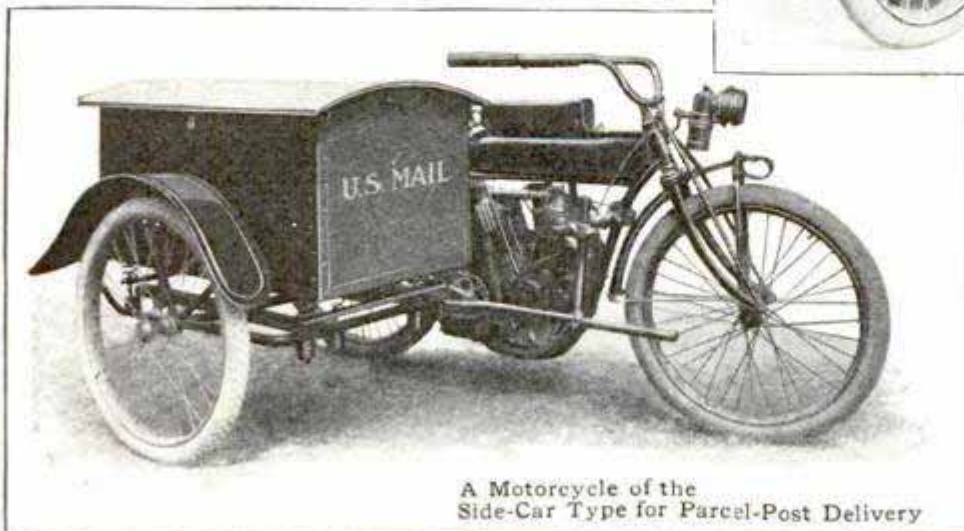


Light Parcel-Post Rural-Delivery Automobile, Designed for Postoffice Service

delivered by nearly 43,000 rural carriers, on horseback, in buggies, two-wheeled carts, motorcycles and automobiles. The horse and motorcycle may have to go, and even the rural



Motorcycle Equipped with Small-Parcel Carrier



A Motorcycle of the Side-Car Type for Parcel-Post Delivery

tracts. When the new service is well under way, the Postmaster-General believes that express motor trucks and large wagons will have to be used to take care of the delivery of goods, but motorcycles of the tri-car type, shown in one of the

*6. B. J. M. Co
Warner & Bayard
Baltimore*

Boeing

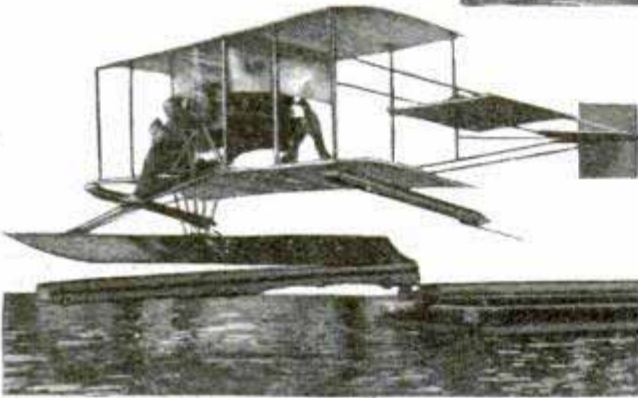
*Harley Davidson Motor Co.
392 13. St.
Milwaukee Wis*

illustrations, will be used, where possible, as will the lighter type of parcel-post automobile, also shown, which was designed particularly for rural delivery.

For office equipment, the government has purchased 125,000 scales. Two hundred of the largest postoffices,

will have automatic computing scales, the next class of offices, numbering 10,000, will be equipped with high-grade beam scales, while fourth-class offices, numbering about 55,000, will be furnished with the best spring-balance scales obtainable. These small scales have a capacity of 20 lb.

HYDRO-AEROPLANE LAUNCHING WAYS FOR BATTLESHIPS



Apparatus Tested, the Aeroplane Rising from the Sliding Car

Launching ways for hydro-aeroplanes, occupying so little space that they may be swiveled on a big-gun turret, or moved to any desired location on a ship, have been devised by Captain W. I. Chambers, U. S. N., who is in charge of navy aviation work. Such a device, which may be dismantled and stowed in a space no more than 8 ft. long and wide, is an interesting departure from the cumbersome and unwieldy apparatus previously designed for aeroplane launching.

The Chambers apparatus, which is called a catapult, comprises a wooden car, upon which the aeroplane rests, a swivel track, and mechanism for projecting both car and aeroplane from the track with ample and smoothly increasing force. The propelling mech-

Compressed-Air Cylinder Ready to Force Forward a Sliding Car Loaded with Sand Bags

anism may be a spring, a weight, an electric motor, or, as at present demonstrated, a compressed-air cylinder and piston actuating, through multiplying gear, a wire rope attached to the car. Compressed air is used for power because all ships carrying torpedoes are supplied with air compressors.

In preparing for a launching, the aeroplane is strapped on the car and swiveled toward the wind. The aeroplane engine is started, the propellers turning at full speed, and when the pilot is ready to depart a balanced air valve is turned, the piston of the launching cylinder moves faster and faster as the valve is further opened, a flying speed is attained in less than two seconds, and the car and aeroplane are projected from the track, the car being automatically released from the aeroplane and falling into the water, while the aeroplane soars away. The car, to which a rope is attached, is then drawn back aboard ship.

¶ Fifty-eight blackfish, or pilot whales, were recently driven ashore at Indian Neck, Wellfleet, Mass. This was the first appearance of the fish in that section in nearly 30 years.

PORTABLE CONTROL FOR ELECTRIC CRANES

573 A portable electric control, in the form of a box that may be hung by straps from the shoulders of the operator, has been specially designed for controlling cranes in the loading and unloading of ships. The operator stands at a convenient place beside the hatchway of the ship, where he can see what is going on in the hold, or can walk around freely, the control box being connected with the crane mechanism by means of a flexible armored cable. The controller is provided with two handles, one for controlling the hoisting and lowering motions, the other for the slewing or swinging of the crane, and an emergency button by which the current can be cut out and the crane brought instantly to rest.

Although the crane motors may be worked from a 500-volt supply, only 100 volts are used in the portable controller, a small motor generator being placed in the crane cabin for the provision of this low-voltage current.

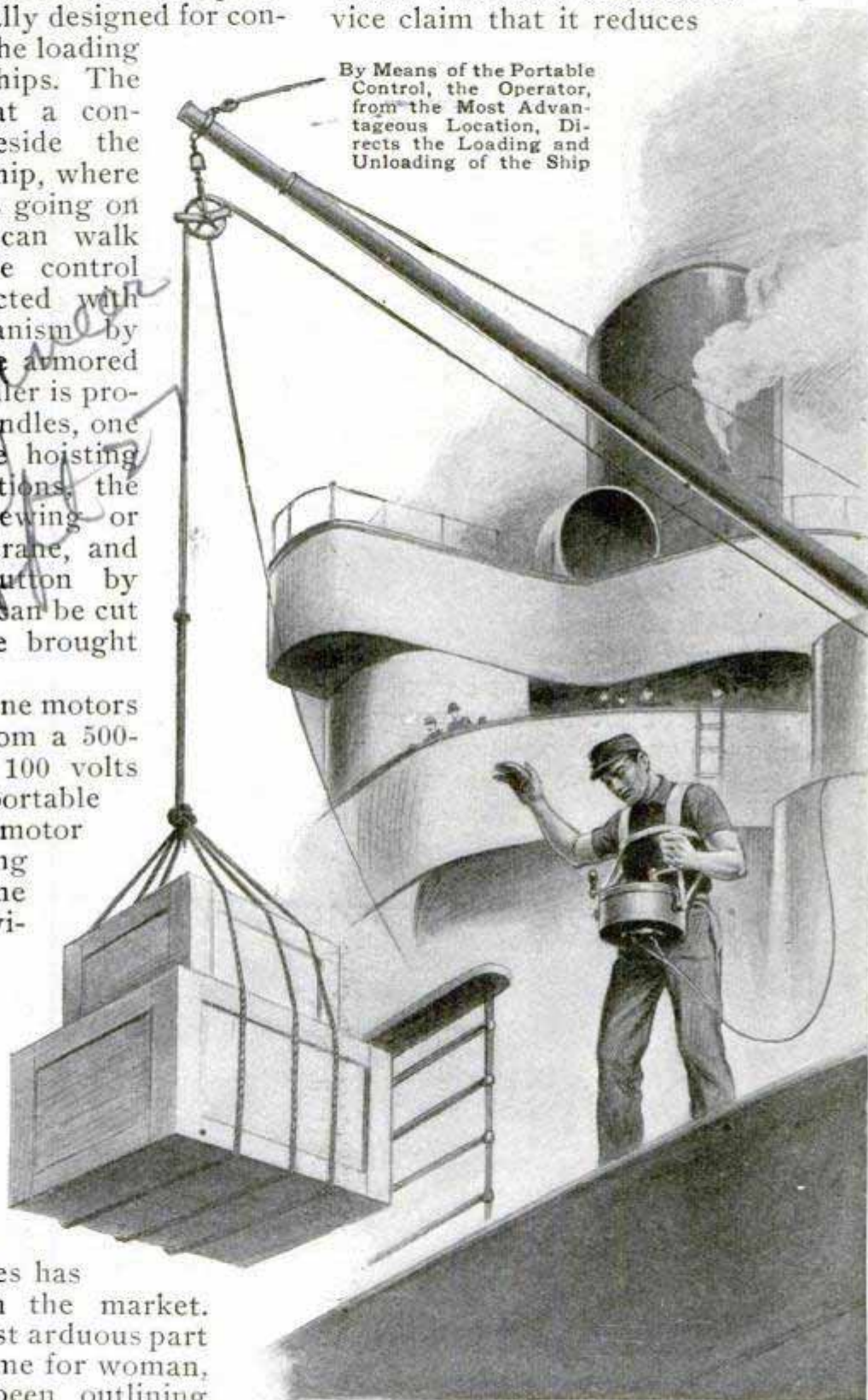
MAKING EM- BROIDERY EASY

A simple little device economizing woman's time and woman's nerves has just been put on the market. Heretofore, the most arduous part of the trying pastime for woman, embroidery, has been outlining and giving backing to the pattern, by means of rough stitches.

The device which promises to do away with this work consists of paper

pulp pressed into the shape of the pattern, with the flat side gummed so that it can be fastened on the garment to be embroidered, and the finishing stitches are made over this backing. Those who have tried the device claim that it reduces

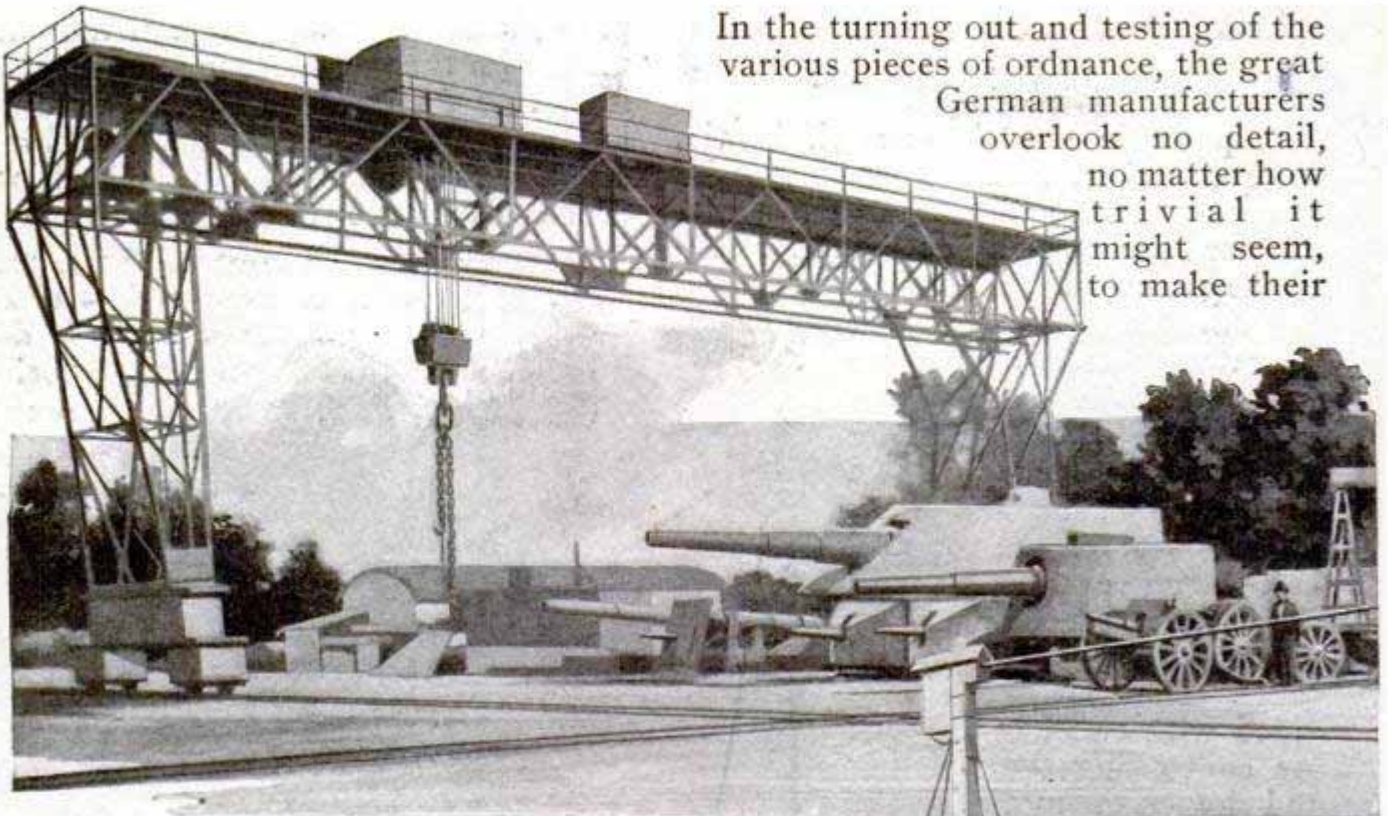
By Means of the Portable Control, the Operator, from the Most Advantageous Location, Directs the Loading and Unloading of the Ship



the work about half and that the finished embroidery is much more even.

These paper scallops and alphabet designs are now on sale.

In the turning out and testing of the various pieces of ordnance, the great German manufacturers overlook no detail, no matter how trivial it might seem, to make their

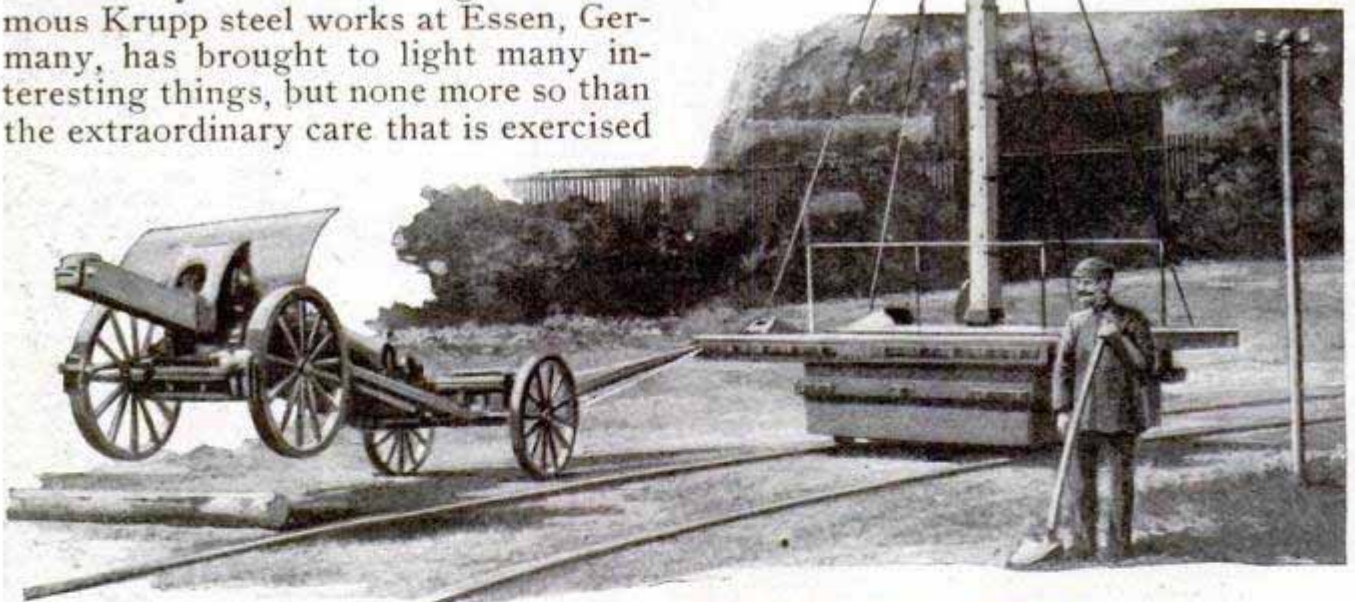


KRUPPS SUBJECT GUNS TO SEVERE TESTS

The celebration of the hundredth anniversary of the founding of the famous Krupp steel works at Essen, Germany, has brought to light many interesting things, but none more so than the extraordinary care that is exercised

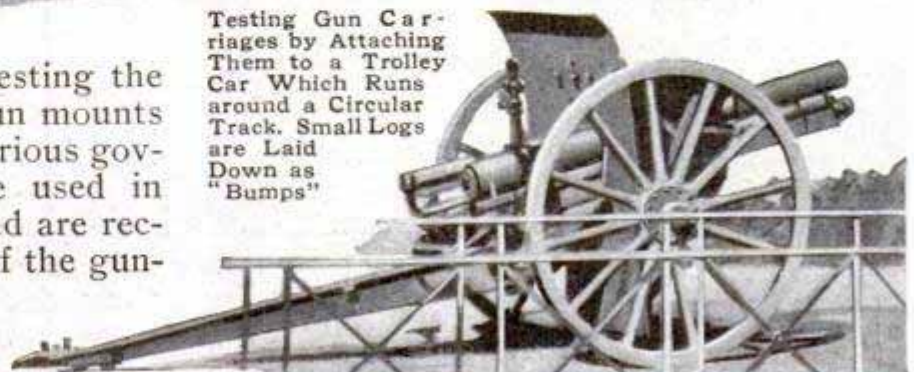
A Line-Up of Big Guns, Field Fortifi

Guns in Turrets, Rapid-Fire Pieces and Coast-cation Guns

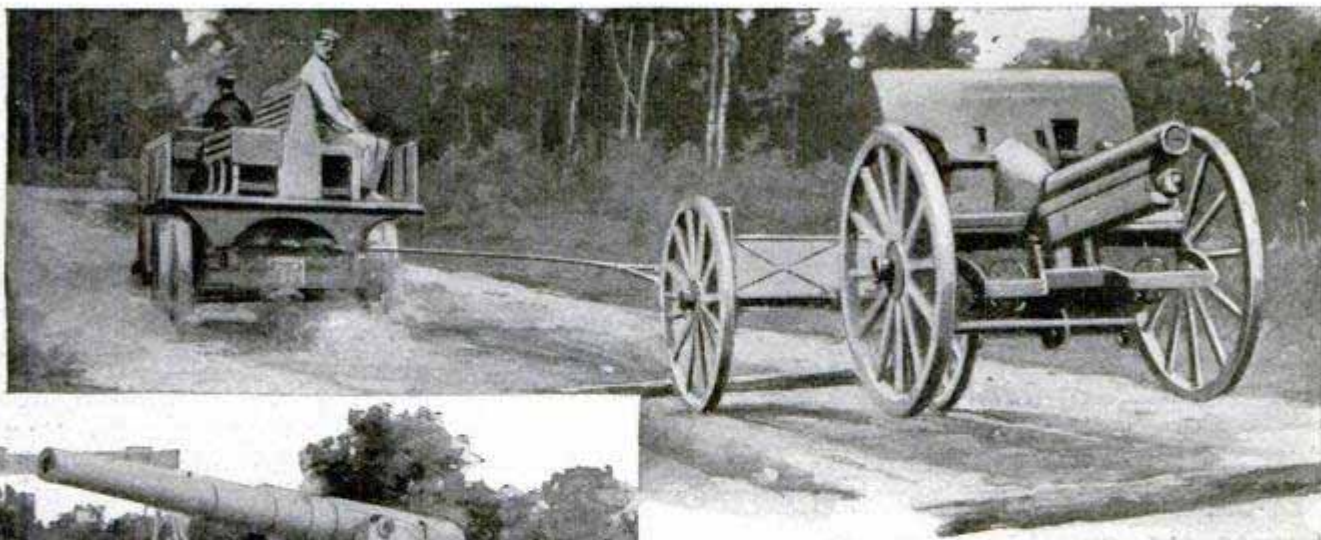


by the famous founders in testing the various kinds of guns and gun mounts manufactured by them for various governments. Krupp guns are used in every section of the world and are recognized as the highest type of the gun-makers' art. Even in this country there is at least one battery of Krupp guns in an American fortification.

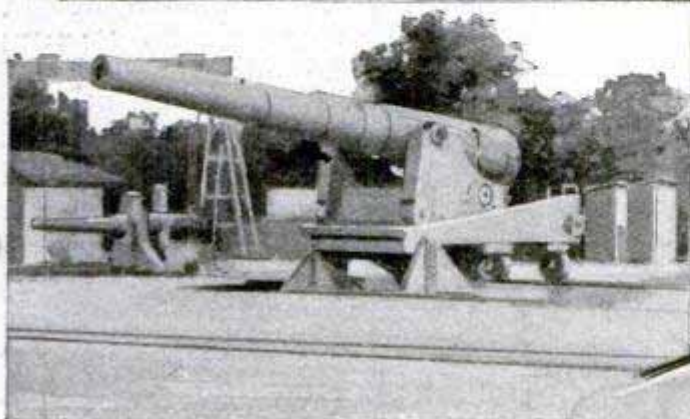
Testing Gun Carriages by Attaching Them to a Trolley Car Which Runs around a Circular Track. Small Logs are Laid Down as "Bumps"



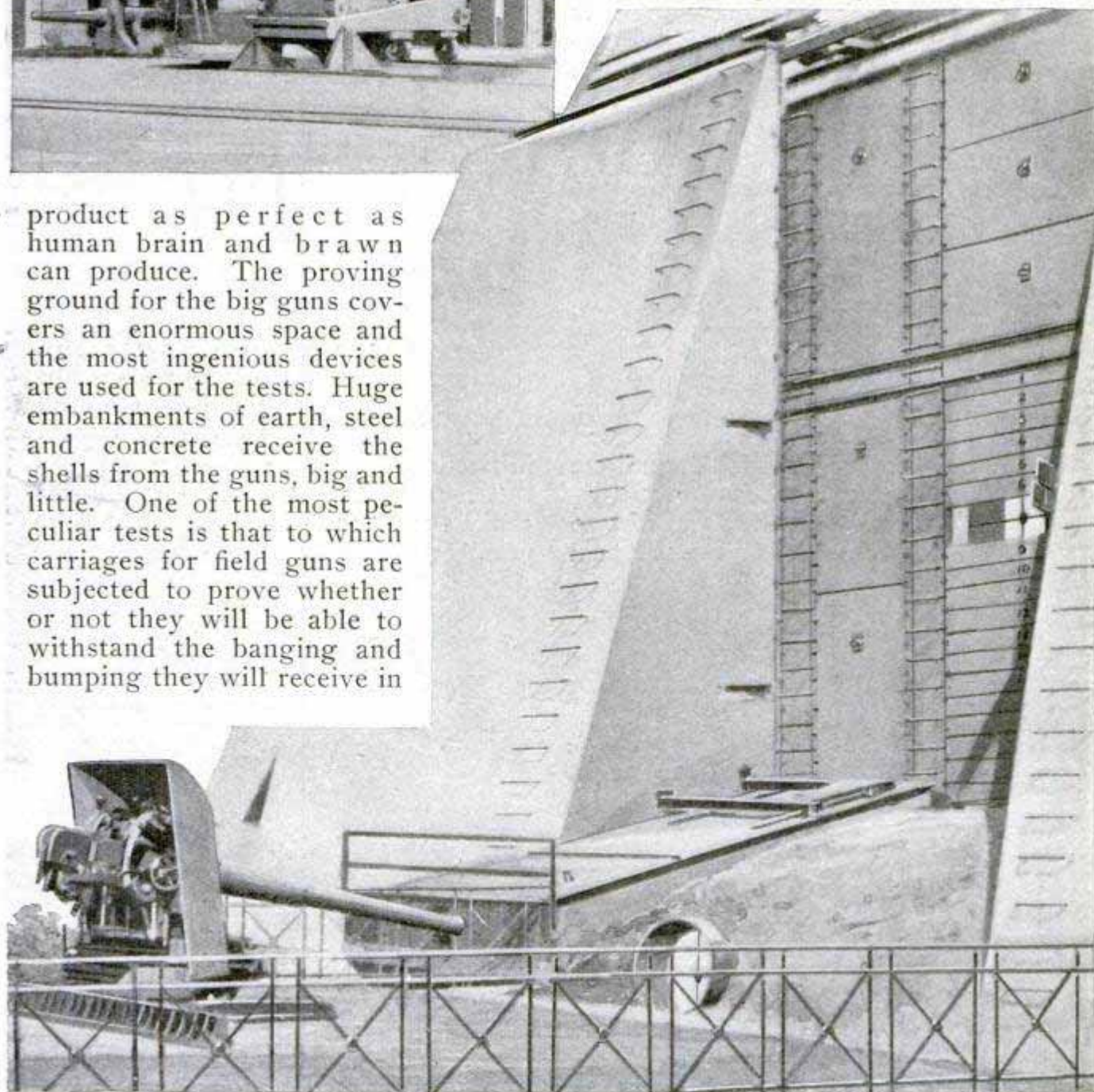
Two Guns Lined Up before One of the Big Target Walls of the Krupp Works.



Another "Bumpy"-Road Test for Gun Carriages, the Guns being Towed by a Motor Truck



product as perfect as human brain and brawn can produce. The proving ground for the big guns covers an enormous space and the most ingenious devices are used for the tests. Huge embankments of earth, steel and concrete receive the shells from the guns, big and little. One of the most peculiar tests is that to which carriages for field guns are subjected to prove whether or not they will be able to withstand the banging and bumping they will receive in

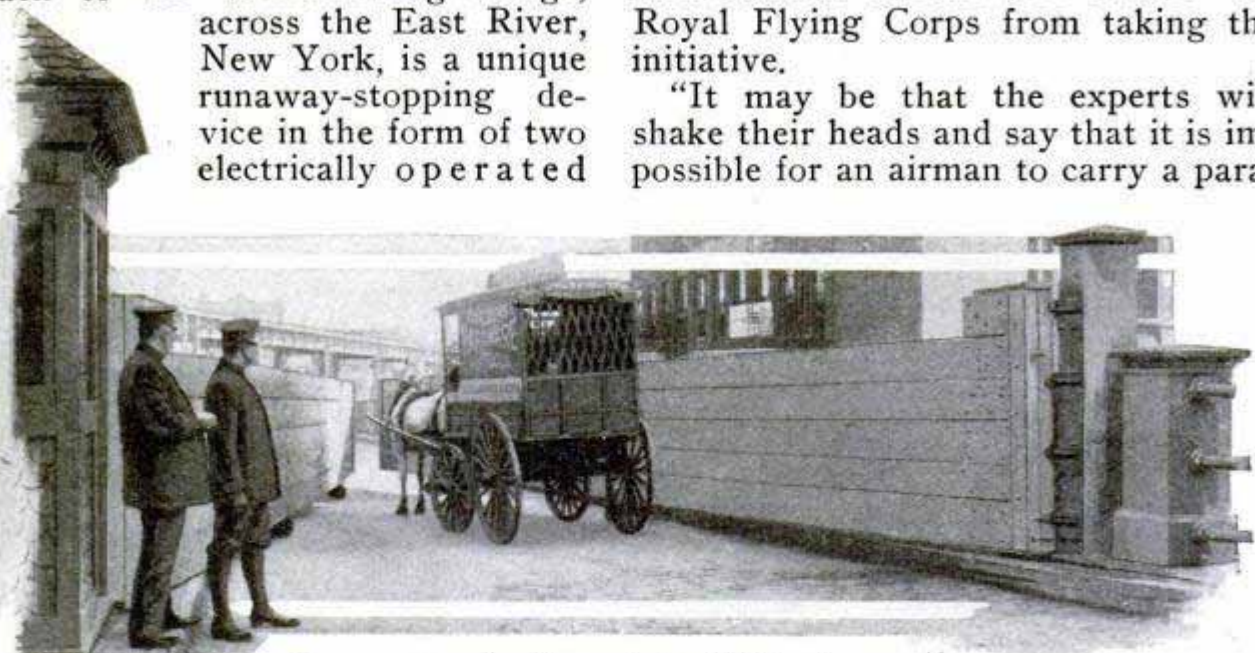


Gun Nearest the Target is a Rapid-Firer for Battleships; the Other is One of the Latest Types of Light Field Artillery

actual service. These tests are carried out on a circular track. This is a circle of rails on which a towing device is run by means of a long arm extending from an electric motor in the center. The gun carriage with the gun mounted is secured to the towing car and is whirled around the circle. The path over which the gun carriage must go is strewn with big stones, logs and all manner of obstructions, and the carriage is supposed to go over all these things at high speed and come through in perfect condition. Sometimes the carriage is thrown several feet into the air when it strikes a particularly heavy obstruction. There is also a secondary test of the same nature on a regular roadway when the gun carriage is towed by an automobile at high speed. The gun carriage is so attached to the automobile that it travels on a track beside the roadway and obstructions are placed in its path.

GATES FORM RUNAWAY-STOPPING CHUTE

Along one side of the elevated approach to the Williamsburg bridge, across the East River, New York, is a unique runaway-stopping device in the form of two electrically operated



Runaway-Stopping Chute at the Williamsburg Bridge, New York, has Stopped Many Runaways

gates, which form a chute into which the frightened horse or horses run and are brought to a stop, without serious injury to either horse or vehicle.

When a runaway starts, and there are a great many runaways near this bridge, the driver heads for the runaway chute, the policeman stationed at the gate makes ready, and, when the animal passes a certain point, throws over his electric controller. Slowly the big gates swing into the position shown in the illustration. Before the horse can possibly reach the small opening, the sides of the gates catch the vehicle, give sufficiently to assure that the stoppage be not too abrupt, and the runaway is brought to a stop without injury to driver, animal, or vehicle.

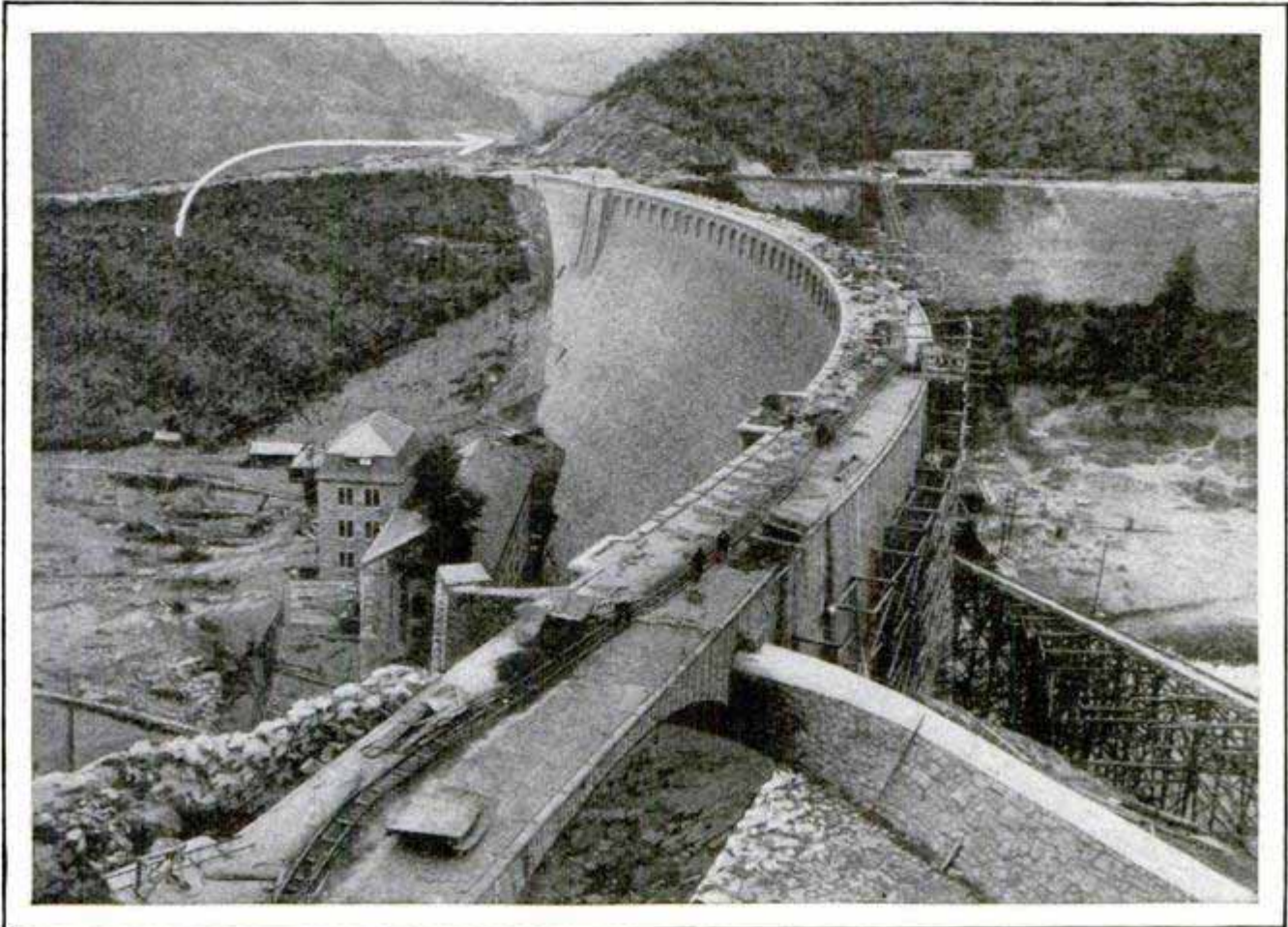
FLYING CORPS ASKED TO TRY PARACHUTES

The large number of fatal accidents recently depleting the ranks of the Royal Flying Corps of England has caused The Motor, London, to make an appeal to those in charge to carry out parachute experiments. It is presumed by this magazine that time and expense are the factors which have prevented civilian English airmen from tackling the parachute problem, but such factors should not excuse the Royal Flying Corps from taking the initiative.

"It may be that the experts will shake their heads and say that it is impossible for an airman to carry a para-

640
The Motor, Sept. 1912

chute," says The Motor. "Against this we are in a position to state that the Russian government has carried out some successful experiments with dummy men and parachutes, and fairly



Germany's Largest Dam, Which will Furnish Hydroelectric Power for the Greater Part of Silesia and Form a Protection against Danger to Life and Property in Flood Times. Arrow Points Down a Valley into Which Excess Water will be Diverted, should It Rise to Too Great a Height

satisfactory results have been obtained in France. So it seems that the idea is worth, at any rate, some initial experiments. Assuming a man's weight to be from 150 to 180 lb., then, for him to land safely through the medium of a parachute, there must be an air-resisting area of approximately 500 sq. ft., or, in other words, the parachute must be about 25 ft. in diameter. Now, the question of how such a large parachute is to be carried seems at first sight to be a formidable one, but it is not so impossible as it looks. If the parachute be made of high-grade fine silk and is rolled in a special manner, in such a way as those versed in the subject know how to roll it, then, including the necessary cordage, etc., it can be arranged so as to come into a roll about 18 in. long and not more than 7 in. in diameter. Such an outfit could be carried in a box on the airman's shoulders, a broad strap passing around his chest and under the armpits."

GREAT GERMAN PROTECTING 66/ AND POWER DAM

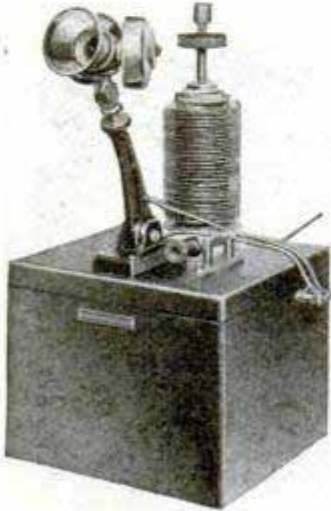
A great dam has been built at Mauer, near Hirschberg, in Silesia, Germany, to shut off a valley, the waters of which caused much loss and danger during flood times, and to impound a supply of water sufficient to provide the greater part of Silesia with hydroelectric power. Work on the dam was started eight years ago.

This dam, which is the largest in Germany, is 918 ft. long, 196 ft. high, 164 ft. wide at the bottom, and 23 ft. wide at the top. The valley closed by it will form a reservoir having a capacity of 1,800,000,000 cu. ft. of water, impounding the waters of the Bober River.

⌈The value of steel exports of the United States, according to the government statisticians, now amounts to a million dollars a day.

TELEPHONING FIFTY MILES BY WIRELESS

612 Although there has as yet been no really successful practical application of the wireless telephone, and no commercial instrument successfully operating for over 10 miles, it is claimed that, in an early test, the wireless telephone installation at Seattle, Wash., broke all records for distance in talking between Seattle and Tacoma. The wireless telephoning took place between J.



B. Annis, of the U. S. Signal Corps, at

the Bremerton Navy Yard wireless station, and the laboratory of the wireless telephone company in Seattle, over mountainous land, the distance of the transmission being about 50 miles.

The transmitter developed by this wireless-telephone company is shown in the accompanying illustration. Mounted at the back of the transmitter arm is the oscillator, provided with radiating flanges to keep it cool. The transmitter is of a double-diaphragm type, so arranged that the diaphragms vibrate against each other.

¶The White Star liner "Olympic," sister ship of the "Titanic," will be laid up the coming winter for a thorough reconstruction, intended to increase its safety. The work will mainly involve the construction of a complete inner hull, the cost being estimated at over \$1,000,000.

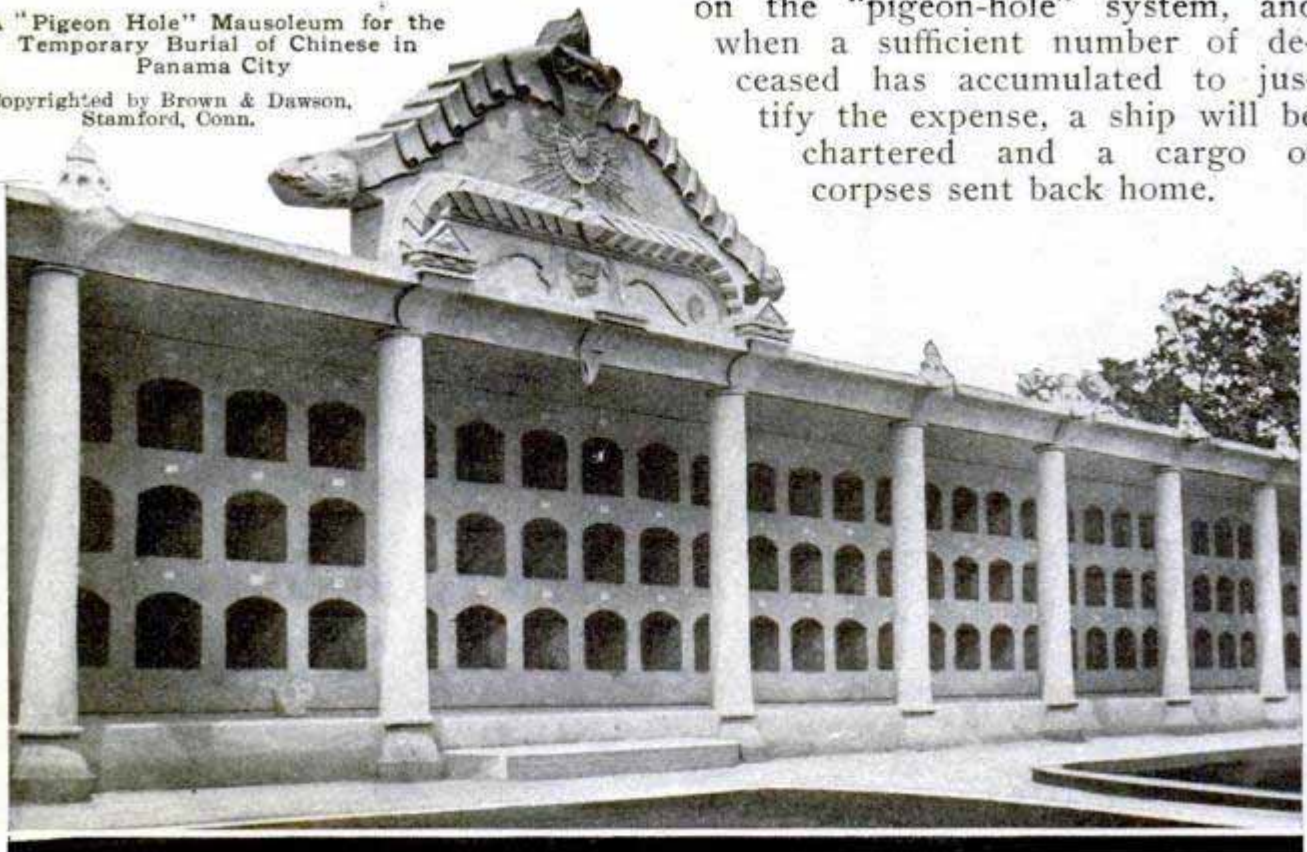
TEMPORARY BURIAL PLACE FOR PANAMA CHINESE

694 A great number of Chinese live in the city of Panama and the Canal Zone, and, as it is part of the Chinese religion that burial outside of the "Ce-

lestial Kingdom" means being shut out of heaven, the structure shown in the illustration was erected as a temporary burial place. It is constructed on the "pigeon-hole" system, and when a sufficient number of deceased has accumulated to justify the expense, a ship will be chartered and a cargo of corpses sent back home.

A "Pigeon Hole" Mausoleum for the Temporary Burial of Chinese in Panama City

Copyrighted by Brown & Dawson, Stamford, Conn.



The rear wall of this mausoleum is about 10 ft. thick and is perforated with three rows of holes, each just large enough to hold a body. After the coffin is inserted, the hole is sealed up with cement.

GLASS TUBES FINER THAN HAIR

To produce glass tubes three one-hundred thousandths of an inch in inner diameter and with the walls only four millionths of an inch thick would seem beyond human skill, but it is not only possible but, one might even say, comparatively easy. The apparatus by which this was accomplished was recently shown before a convention of scientists.

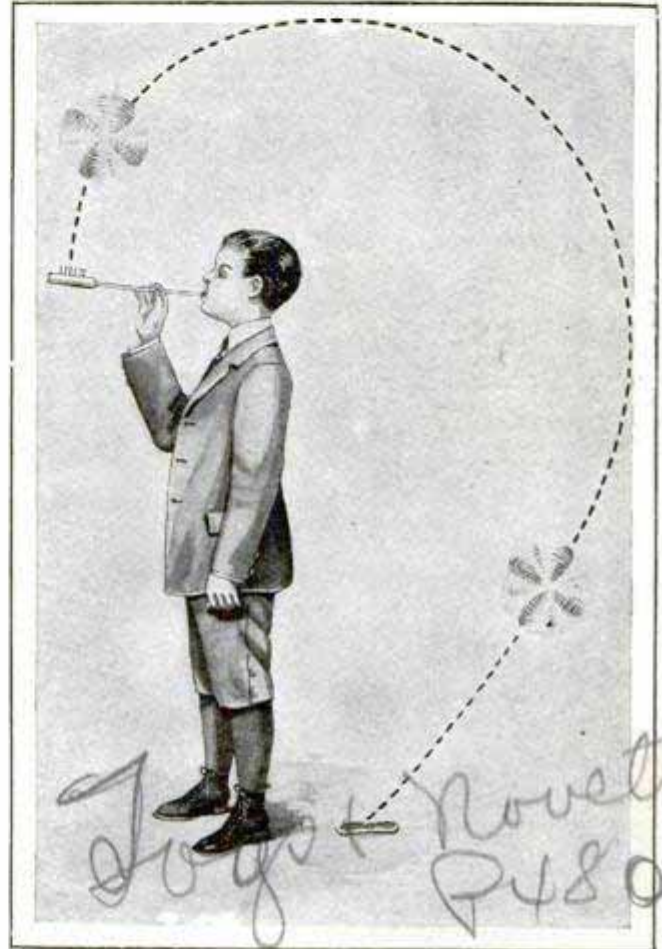
It consists of a small electric furnace—a rectangular box of mica—which incloses a small, vertically placed spiral of platinum wire. The glass tube to be drawn out is placed inside this spiral, and in order that only a little of the tube be exposed to the heat when current is passed through the platinum wire, it is for the greater part of its length protected by a brass covering. To the lower end of the glass tube is welded a metal cylinder—of course outside of the mica box—which plunges into a long tube filled with glycerine and water. When the current is turned on, the exposed part of the small glass tube becomes heated, the metal cylinder at its lower end, by reason of its weight, drawing it out slowly and gradually sinking into the glycerine solution. New parts of the glass tube are thus continuously brought out of the protecting brass tube, heated and drawn out, until tubes of the above-mentioned dimensions can be obtained.

These fine tubes are used for the suspension of the coils of very sensitive galvanometers, and can be made conductors of the electric current by silvering or by filling them with mercury. They have a surprising strength, reaching 5 grams for the dimensions given, which corresponds to over 12,000 lb. per square inch.

U.S. Pat. 1912.
Invented by California
A "BOOMERANG" BLOW

602 PIPE GLIDER

One of the new glider toys placed upon the market this year is a whirling-wheel glider which describes an arc over the person blowing it into the



A Blowpipe Glider Which Returns to the Feet of the Player

air and returns to his feet from the rear. The glider is in the form of an elongated plate with ends turned down and is somewhat similar to a pinwheel. It is set upon pegs at the outer end of a blowpipe, and when air is puffed through the latter it rises into the air.

Ⓒ About one per cent of the total wealth of the United States as a whole is invested in church property, but, according to Dr. Booker T. Washington, more than eight per cent of the wealth of the negroes of the country is invested in 35,000 churches and church institutions which have a membership of 3,700,000.

AUTOMOBILE HEADLIGHT AS TROUBLE SIGNAL

During some recent army and militia maneuvers, in which motorcycle and automobile scouts took part, the



Signaling for Help by Directing a Headlight into the Air

method shown in the accompanying illustration was suggested as a means of signaling to other scouts, should a car run out of gasoline or break down. The idea is to swing one of the headlights upward on its mounting until the beam of light rises vertically into the air. The same scheme can be followed out with ordinary pleasure cars that meet with trouble on the road, if the purpose of the vertical beam becomes generally known to motorists.

NEWLY DISCOVERED YEAST USEFUL FOR DYEING

Kazuo Ando, a Japanese chemist, has announced the discovery, in Japanese breweries, of a fungus closely related to the yeast fungi. It is remarkable not only on account of the fact that it does not cause fermentation, but also because it is a beautiful

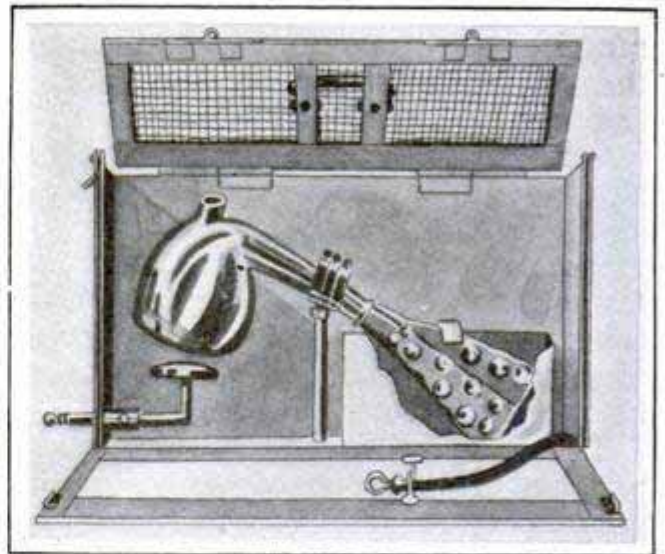
red in color, and because the extract from the yeast dyes silk a light rose color.

If these yeasts are grown in a solid gelatine, they cause it to turn into a liquid. At first it was thought that they might do considerable damage to beer, but now it is found that they are harmless in this respect. He has made many experiments with them as a dye, though there is no immediate prospect of their being commercially available for this purpose.

PORTABLE RETORT FOR SURGEONS

In order to enable a surgeon, in a case of emergency, to quickly produce a quantity of distilled, germfree water for the dressing of a wound, or the like, a surgical firm has brought out a portable distillation apparatus.

The retort proper is heated either electrically or with an alcohol lamp and the receiver, which rests in a small inclosed tank holding about 1 qt. of water, is provided with tubular canals running through it, to increase the cooling effect of the water. About a pint of pure water can thus be obtained very quickly. The retort and receiver are first strongly heated to insure



Device by Which a Surgeon may Quickly Obtain Distilled Water for Use in Connection with Operations

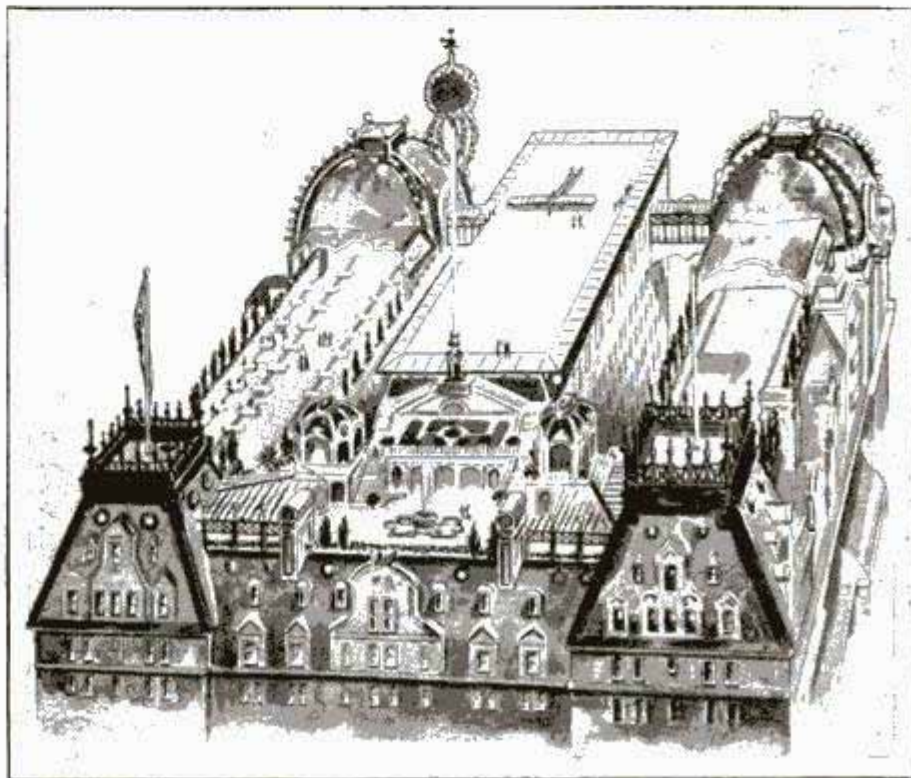
sterilization and, being made of a special glass, endure this treatment without danger of being damaged.

**MEMORIAL TO "TITANIC'S"
WIRELESS OPERATOR** 690

A rectangular cloister, 120 ft. square, is to be the memorial to John George Phillips, the wireless operator of the "Titanic." It will be erected upon land given for the purpose at Godalming, Eng., which was the home of Phillips, and the structure will face the main Portsmouth road. On entering the inclosure, there will be a wide paved space with a small, square middle garden consisting of beds of dwarfed shrubs and flowers with grass between, and a central circle will contain a fountain. The sides to the right and left of the entrance will consist of an unbroken cloister, but the wall of the further side will be arcaded instead of cloistered, giving a singularly beautiful view, through the arches, of the meadow and woods beyond. There will be seats under the cloisters, some portion of which will always afford comfortable protection from the weather, no matter in what direction the wind is.

**AEROPLANE LANDING OF
PHILADELPHIA HOTEL** 482

When the new addition, now under construction, of a well-known Philadelphia hotel is completed, airmen will



The Aeroplane Landing of a Philadelphia Hotel

be able to fly over the city and land on the roof. The landing platform will be 100 ft. long by 50 ft. wide, a series of buffers, with sandbags attached, will be utilized to break the momentum of the machines, and a trap will catch the aeroplanes and prevent them from falling off the roof.

If the innovation proves popular, the management of this hotel, which likewise operates one of the large New York hostleries, will construct a landing on the roof of the latter, so that flights can be made between the two establishments.

**A "RAINCOAT" FOR THE
STRAW HAT** 603

Believing that the damage done to straw hats by rain warrants a special "raincoat" for their protection, a southern concern has placed such an article on the market. The rubber hat cover, which weighs next to



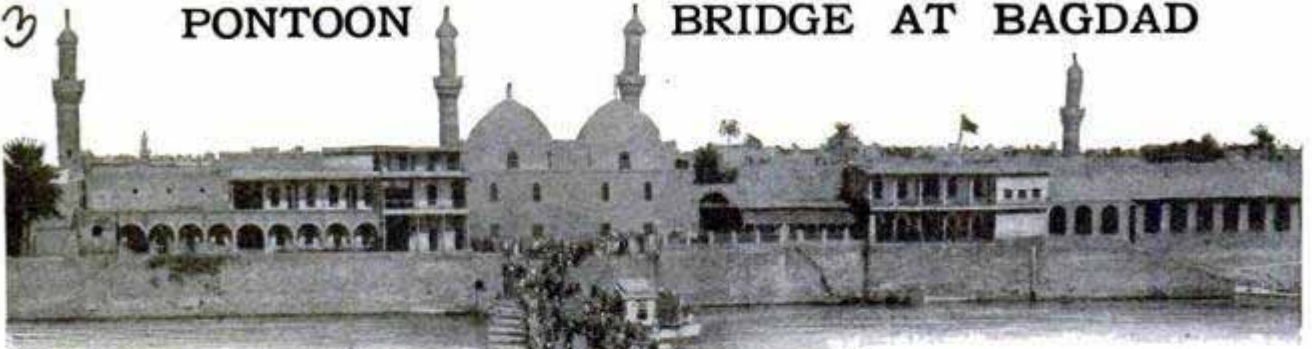
nothing, can be rolled up and tucked into the corner of a pocket.

China is the greatest consumer of old newspapers, according to the Shanghai Review; the port of Niuchwang alone having imported no less than 1,918 tons in 1911. The Chinese middle class use it for wall paper because it is stronger than the home article and is supposed to exclude fleas effectively. They also make underclothing of it.

Patent Rubber Hat Protector Co. Nashville Tenn

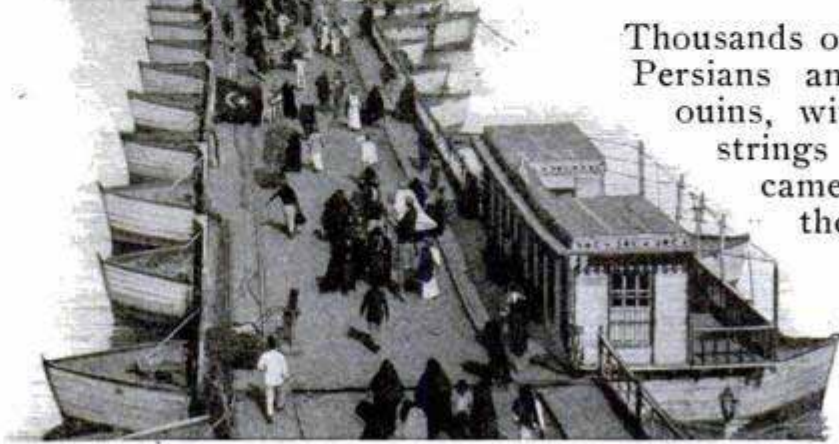
Nashville Rubber Hat Protector Co

PONTOON BRIDGE AT BAGDAD



653

A novel pontoon bridge crosses the Tigris River, connecting the east and west parts of the ancient Arab city of Bagdad. This bridge is coupled in the middle, where each part is also anchored, but in flood times, should the current become so strong as to threaten the bridge, it is uncoupled and the two parts swing downstream and rest against the banks on each side.



Thousands of Arabs, Persians and Bedouins, with their strings of pack camels, cross the bridge daily.

Pontoon Bridge is the Main Connecting Link of the Western and Eastern Parts of Bagdad

Foot walks are provided for pedestrians on each side, but these are seldom used unless the bridge is crowded.

PNEUMATIC WOODCARVING TOOL

559

A line of pneumatic carving tools, especially adapted for working in wood, is now being marketed by a concern which has been furnishing the

stoneworking trades with a pneumatic tool for some time. The former, in fact, are simply adaptations of the latter. It is claimed that the pneumatic woodcarving tools will do work of any description turned out in the past with hand chisels.



The Pneumatic Woodcarving Tool in Use

CORK WADDING FOR SHOT CARTRIDGES

A new wadding for shotgun cartridges, made of granulated, very elastic cork from which all grit and hard substances have been mechanically eliminated, has recently been brought out in France. The cork particles are ground, impregnated with paraffin, molded, and talcum powder rubbed into the outside.

Official experiments, at the gun factory of Saint-Etienne, are said to prove that even if the cartridges are overcharged with powder, thus giving the shots a considerably greater penetra-

Thos. H. Baller Co

tive effect, there is produced no pressures dangerous to the huntsman; the recoil is rather below normal and the internal pressure somewhat less than the average.

ELECTRIC TOWBOAT USED ON FRENCH CANALS

A new type of electric towboat for use on the French canals, which are primarily intended for freight traffic and very shallow, is shown in the accompanying illustration.

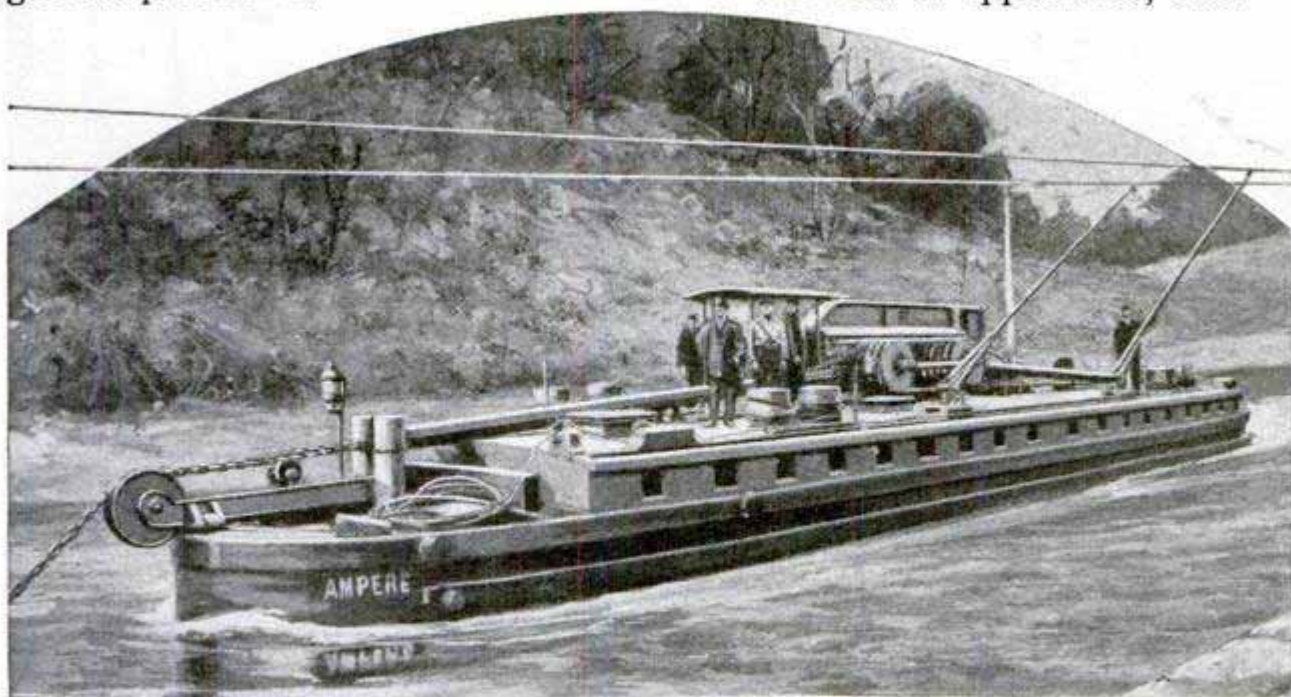
By its power and the perfection of its machinery it is considered by French builders one of the best of this class of vessels. In accordance with traffic regulations of the Saint-Quentin canal, where it is at present in service, its prow and stern are exactly alike and each provided with a rudder and propeller. Its power equipment consists of two 50-hp. electric motors operating the towing-cable drums, and two motors of the same power for the propellers. It is 82 ft. long and draws 4 ft. of water. The supply of electric current is taken from overhead wires, a storage battery being also installed for emergency service. It is built of steel and divided into seven water-tight compartments.

RAINCOAT CONVERTED INTO MOTORCYCLE SUIT

654 An old raincoat, mackintosh, or like garment, can be made into an excellent outer garment for motorcyclists, according to a motorcycle enthusiast who accomplished the conversion in the following manner. He slit his raincoat down the back about the length of the regular overcoat vent, sewed five buttons on each edge, and attached clasps corresponding to the buttons on each side of the front of the coat. When buttoned together, the one-piece suit so made completely covered his "good" clothes, and was trim in appearance, also.



Raincoat Cut Over and Fitted with Buttons, to Form a One-Piece Suit



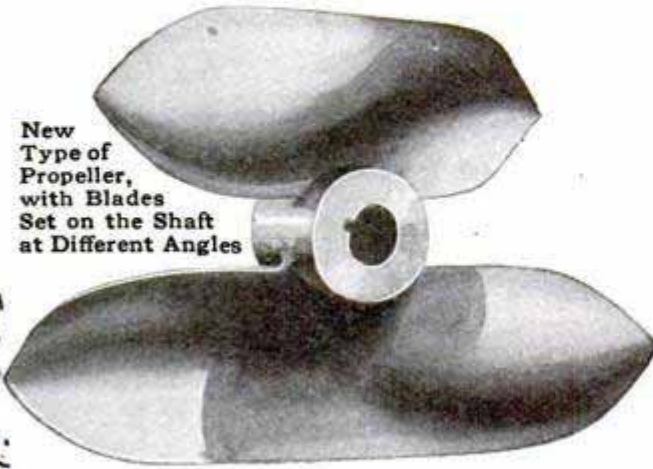
Electric Towboat Just Built for French Canal

A NEW TYPE OF PROPELLER

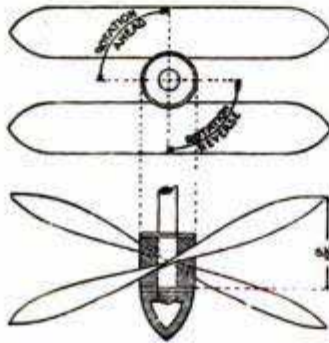
427
429

A new type of propeller for air or water, which its inventor calls a "non-gyro" propeller, is shown in the ac-

New Type of Propeller, with Blades Set on the Shaft at Different Angles



companying illustration. This propeller is based on the idea that the most efficient blade has a spiral-like curve at one point and is concave at another. The water is picked up at the first-mentioned point and carried the extreme length of the blade. It has been run in weeds without picking them up.



Last winter the inventor constructed an ice boat and mounted a 6-ft. air propeller of this type upon it. Turning at a speed of 950 revolutions per minute, it drove the boat at a speed of 40 miles an hour.

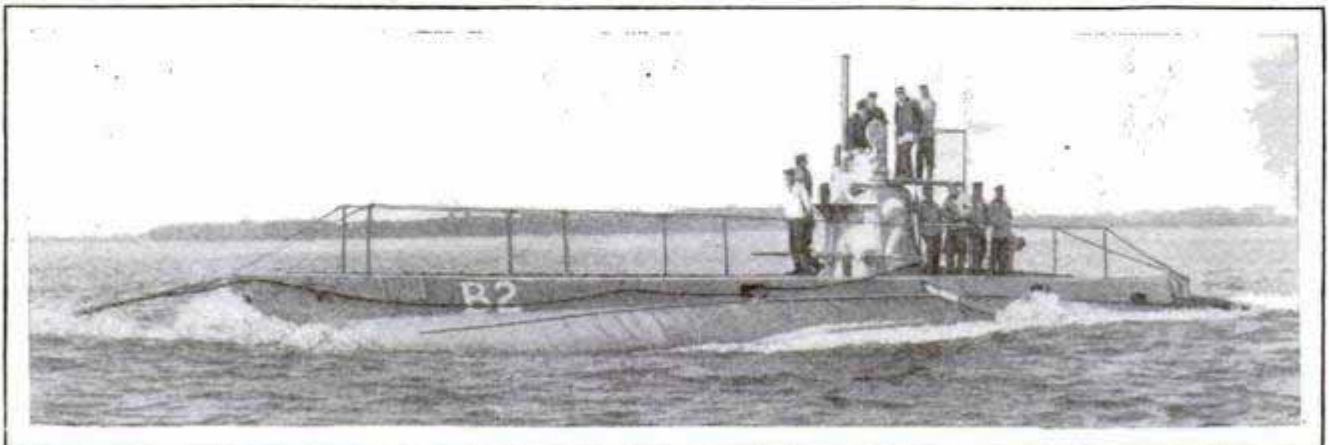
COTTON ROPE DOES NOT BECOME TIRED

Cotton ropes used for power-transmission purposes do not seem to be so exposed to mechanical "fatigue" or weakening through long-continued use, as one would naturally suppose this not very strong material to be. At least this appears to be proven by experiences with such ropes in England, where, in one instance, 24 cotton ropes, 1 3/4 in. in diameter, employed for direct transmission of 820 hp. from a 28-ft. flywheel, have performed service for 34 years and are still in good condition. There have been several other instances of this sort noted in engineering publications and it is regarded as a common thing for cotton rope to last from 11 to 15 years. As the cause of such longevity is suggested their chance of rapid recovery from strain, since they pull only on one side of their travel and rest on the other.

ENGLAND LOSES ANOTHER SUBMARINE AND CREW

Another submarine disaster has been added to the steadily growing list of such accidents in the British navy. Submarine "B2," carrying officers and crew to the number of 16 men, was struck amidships by the Hamburg-American liner "Amerika" off Dover, and sank like a stone in 120 ft. of water. The only survivor was Lieut. R. L. Pulleyne, who was on the deck of the submarine when she foundered. He

Ans. A. Steering mechanism. It is

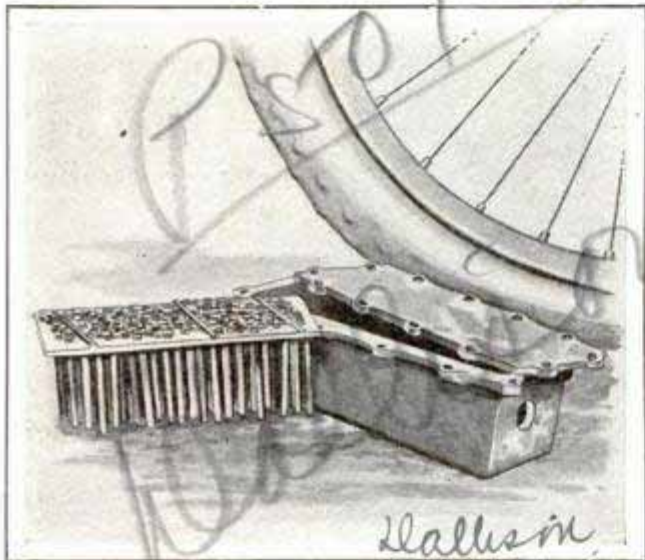


British Submarine Sunk by a Transatlantic Liner with a Loss of 15 Men

Motorcycle Sept 20
 was sucked down with the submarine and reached the surface again with just enough breath to say: "Submarine cut in two. I went down a mile."

552 **NEW SILENCER FOR MOTOR-CYCLE ENGINES**

The simple method by which a new motorcycle-engine silencer obtains a maximum radiating surface for cooling the gases, with the object of reducing the noise of the cylinder explosions, is here shown. From a plate in the top of the casing are suspended a great number of short flat rods, each passing through a slot in the plate. They thus hang loosely in the plate,

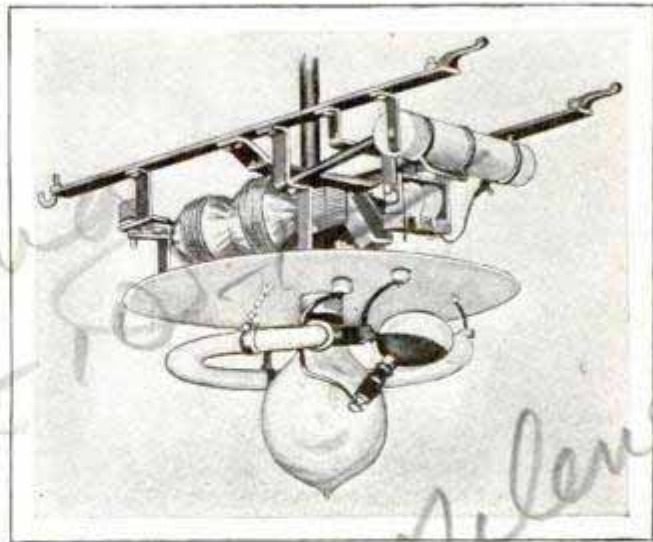


A New Motorcycle Exhaust Silencer Which is Claimed to be Very Effective

but their movement is sufficiently restricted to prevent undue jangling. The bars provide an exceptionally large cooling area for the gases, and it is claimed that the silencing of the exhausts is accomplished with much less loss of power than with other types.

625 **COMBINED MERCURY-VAPOR AND TUNGSTEN LAMP**

Following a number of experiments which showed that mixing the lights of the tungsten and mercury-vapor lamps in the right proportions would provide a color apparently not far removed from daylight, the lamp here shown has been developed. It is a tungsten

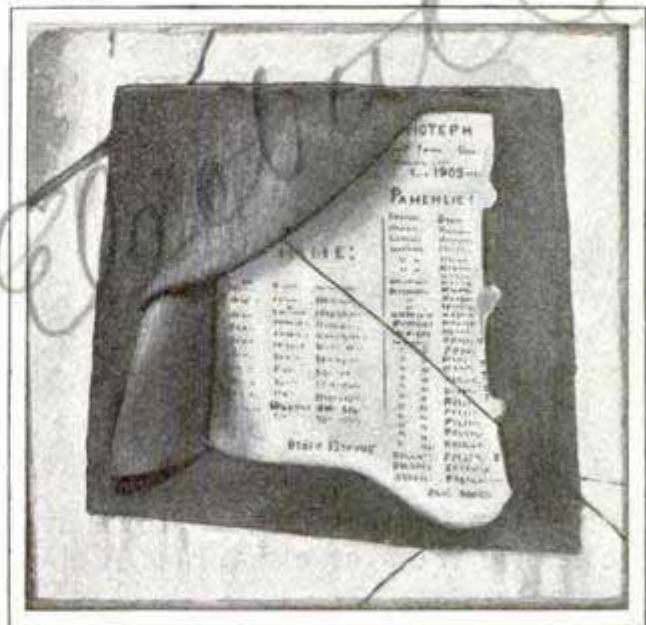


The Tungsten Lamp and the Mercury-Vapor Lamp Combined in a Compact Unit

and mercury lamp combined in a very compact form of unit, the mercury tube being circular, with the tungsten lamp mounted at its center. The two lamps are in series, the tungsten filament being arranged to act as ballast resistance, thus reducing the amount of power usually lost in this way.

FRAGMENT OF ARMOR PLATE AS MEMORIAL 657

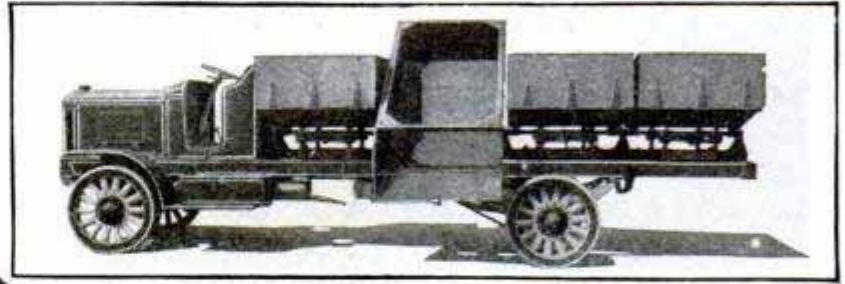
On the quarter-deck of the Russian cruiser "Oleg" is a tragic memorial of the Russo-Japanese war in the shape of a fragment of armor plate, which was pierced by a Japanese shell, inscribed with the names of those who were killed.



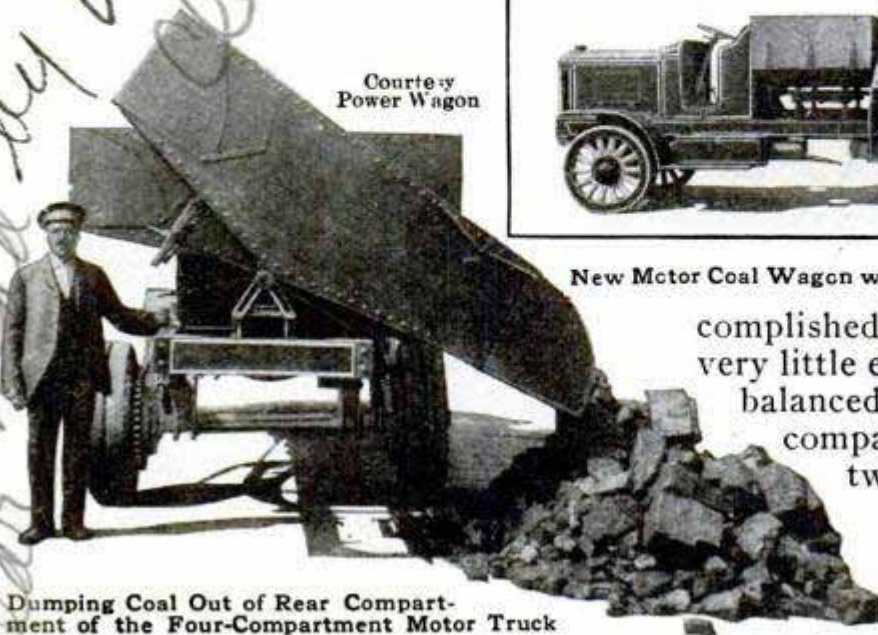
Fragment of Armor Plate of Russian Warship as a Memorial to the Dead

FOUR-COMPARTMENT SIDE-DUMPING MOTOR TRUCK

A motor coal truck having four compartments, each of which may be dumped separately, is shown in the accompanying illustrations. The dumping of the compartments is accomplished separately, is shown



New Motor Coal Wagon with One of the Compartments Tilted



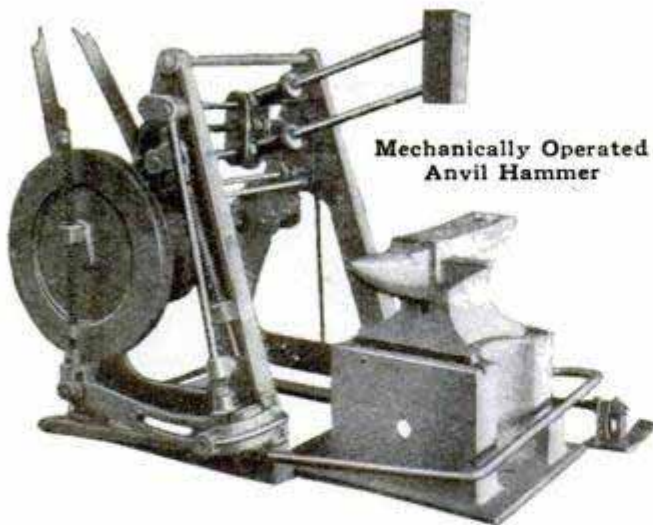
Dumping Coal Out of Rear Compartment of the Four-Compartment Motor Truck

Courtesy
Power Wagon

575
accomplished by hand, but this requires very little effort, as the load is perfectly balanced. To tip any particular compartment, the driver releases two supporting clamps placed at opposite sides under the body, and a slight push upward suffices to unbalance the weight.

A MECHANICAL ANVIL HAMMER

An ingenious mechanical anvil hammer has recently been constructed and put on the market. The speed of the hammer, the head of which weighs 40 lb., is 95 to 100 blows per minute. An



Mechanically Operated
Anvil Hammer

ing, swaging, heading, or any work of similar character to be done. The operator can regulate the striking of the hammer so as to make a heavy blow or a series of light ones by simply moving a rod, and he can work the hammer from the front, or either side of the anvil, by depressing the surrounding foot rail. Immediately the foot rail is released, the hammer comes to rest. There are no obstructions, such as standards or slides, to interfere with the work.

COLORS USED TO IDENTIFY AEROPLANES

interesting feature of the hammer is the lateral transverse motion.

The hammer head will travel either right or left, any distance required, over the anvil, thus enabling punch-

Tests of a new system for identifying aeroplanes were recently made at a French aerodrome. The under side of the wings were painted in strongly contrasting colors, yellow and black, white and red, for instance, in stripes or simple geometrical figures. In spite of unfavorable weather conditions, aeroplanes, flying as high as 1,500 ft. and more, could be easily distinguished from one another.

MARBLE MOSAIC FOR WINDOWS

Beautiful mosaics in varicolored marbles are common sights as interior wall decorations in public and many private buildings, but it is only recently that it has become possible to produce, industrially, sheets of marble so thin that they are transparent and adapted to replace art glass in decorative windows.

The originator of this manufacturing process, Dr. Alfred Pfaff, of Oberlahnstein, Germany, states that those marbles which naturally possess little or no transparency, make the best panes for the purpose, transmitting a soft light and giving the most beautiful color effects. The panes can be made in thicknesses as slight as .02 to .008 in., and in sizes 20 to 35 in. square. Canada balsam, which is quite colorless when dry, is used to hold the various pieces of marble together.

Some idea of the artistic possibilities of this new material is conveyed by the illustrations which represent marble mosaics which were exhibited at Darmstadt last summer.

Based on their calculations on radioactive phenomena, Prof. R. J. Strutt, of the Imperial College of Science and Technology, London, and Prof. C. G. Darwin, of the Manchester University, assert that the earth is at least 711,000,000 years old.

PRIMITIVE WELL BORING IN CHINA

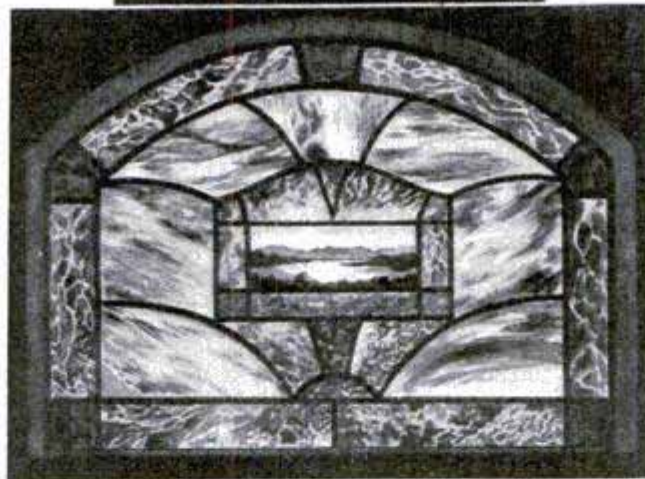
In the province of Szechuen, China, are oil, gas, and salt wells over 2,000 ft. in depth which have been drilled by hand through the solid rock. When everything goes satisfactorily, the work advances at the rate of 2 ft. in 24 hr., so that about three years are required to dig a well.

The manner of drilling these wells is as follows:

If there is a depth of 3 or 4 ft. of soil above the underlying solid rock, the Chinese plant in the earth a tube of hollow wood, the lower end touching the rock. A large stone through which a hole 4 or 5 in. in diameter has been cut, is placed above the upper end of the tube, the hole in the stone being

directly above the hollow tube. The boring machinery is next erected. A large hoisting drum is set up vertically a little way from the well. The axle of the drum is 7 to 8 ft. long, made of wood, and terminates in an iron pin at each extremity, the lower pin working in a dressed stone, the

upper in a strong crossbeam mounted on two firmly fixed wooden tripods. At about 5 in. from either end of the axle there is a row of wooden spokes projecting 4 to 4½ ft., and to the outer ends of these are affixed upright rods parallel with the axle. The skeleton drum is thus formed, and upon it is wound the cable used in raising and



Upper View—Window of Transparent Marble
Lower View—A Lake Scene, Represented
in Transparent Marble

lowering the drill. This cable, of rattan cord, passes from the drum to a wooden lever resting on a wooden frame, where it is attached by means of a swivel. It next passes down the hollow tube, its end being attached to the boring bit, an iron rammer weighing from 200 to 400 lb., which is notched and made a little concave above and convex below. The length of the cable is so adjusted that the lever is horizontal when the bit is just resting on the bottom of the well. To depress the lever and raise the bit, two sets of men jump from side platforms onto the lever and back again to the platforms. Sometimes, however, only one man is employed. The bit is raised about 2 ft. and then let fall by its own weight. About 720 to 900 strokes per hour are delivered. While the bit is in the air, another man twists the swivel a little so that the teeth of the bit strike on a fresh surface. This

man, also, from time to time, throws into the hole a few pails of water to soften the material composing the rock, and reduce it to pulp, which is removed by lowering a cylinder of about 60 lb. weight in which is cut large cup-shaped grooves, into the well. The pulverized rock is forced into the channels of the cylinder by moving the cylinder up and down a few times, whereupon it is drawn up and the powdered rock removed.

To draw water from the well, a 24-ft. tube of bamboo, at the bottom of which is a valve or sucker, is sunk into the well until it reaches the bottom. A strong man works a rope connected with the valve so that every shake opens the latter and permits the water to rise in the tube. The tube being full, a great spindle-shaped cylinder upon which the rope of rattan is wound, is turned by two or more buffaloes until the tube is drawn up.

630

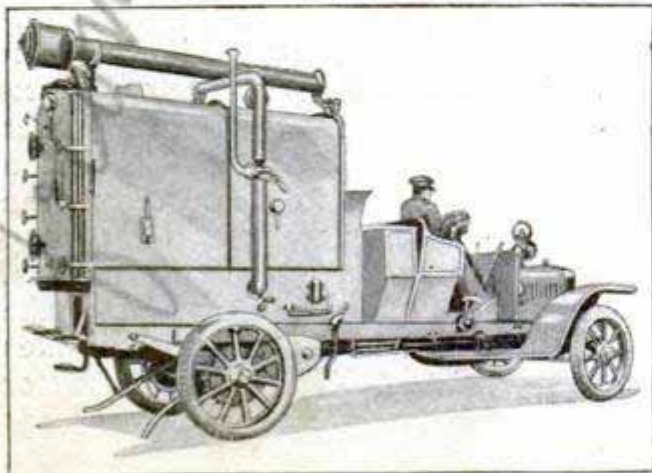
DISINFECTOR MOTOR CARS FOR USE IN GERMANY

Under the new plans of the health authorities in Germany, large districts are to be placed under a central sanitary administration, and three disinfector automobiles of the type shown in the accompanying illustration are to be used to enable a comparatively small staff of health officers to handle the work of disinfection necessary in cases of contagious and infectious diseases.

The use of the disinfector automobiles will make it possible for the officers to follow up the notifications received from physicians quickly, and to go long distances if necessary.

GEORGE WASHINGTON WAS ALSO A FIREMAN

It is not generally known that Gen. George Washington received a portion of his training in coming to the aid of people and communities and rescuing them from danger through service as a volunteer fireman. It probably takes a long stretch of the imagination to picture the "Father of His Country" garbed in a red flannel shirt, an inverted-coal-scuttle hat and a long pair of boots valiantly pushing his way through smoke and flame to save the family portraits from the devouring elements—and yet exact history will show that he did this very thing. He enrolled as a member of the volunteer fire department of Alexandria, Va., as early as 1750, some 25 years before the beginning of the Revolutionary War.



A Disinfector Automobile to be Used in Germany in Cases of Contagious and Infectious Diseases

German to disinfectant (1918)

Built at the Osing-
 ...

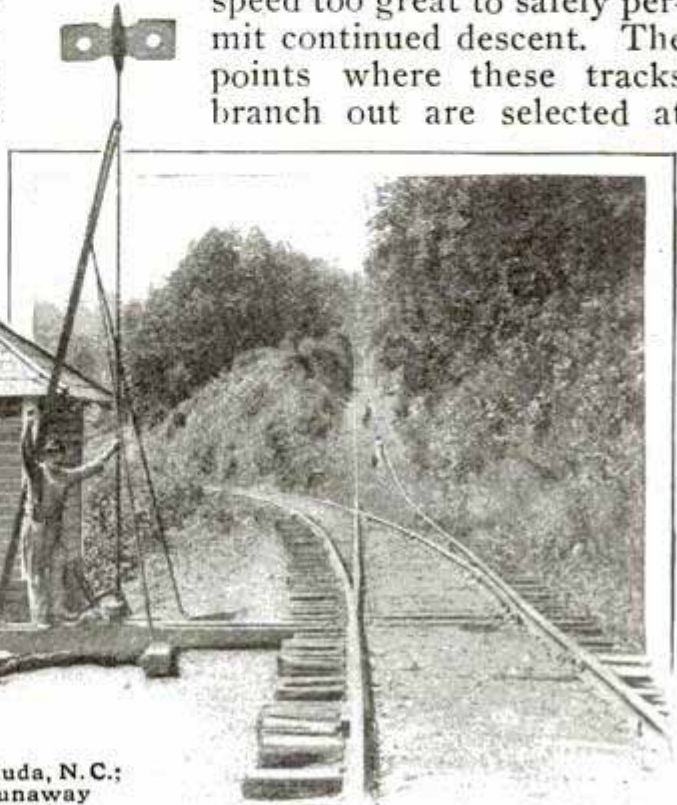
The Fireman's Herald

UPHILL SAFETY TRACKS STOP RUNAWAY TRAINS

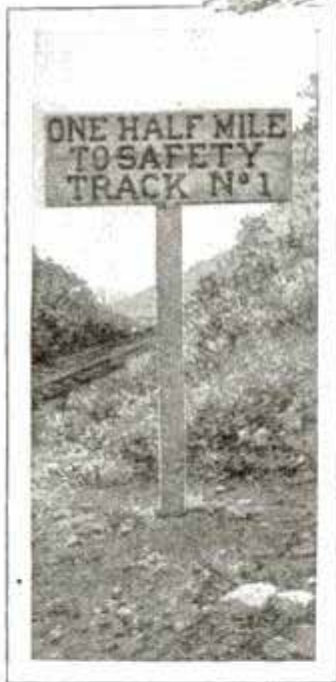
A most remarkable and perhaps unique railroad construction to insure the safety of heavy trains on a steep down-grade is to be found in North Carolina on a section of the Asheville-Spartansburg line from Saluda, at an altitude of 2,200 ft., to a point three miles distant and 732 ft. lower, the average grade thus being 244 ft. to the mile.

While the passenger trains, which are equipped with air brakes of sufficient capacity to make a runaway practically impossible, safely descend the grade, it is not so with the freight trains with their heavy cargoes of coal and old-style hand brakes,

track, onto which a descending train may be switched, should the engineer lose control over it or consider its speed too great to safely permit continued descent. The points where these tracks branch out are selected at



First "Landing" near Saluda, N. C.;
Switch Set to Stop Runaway
Train by Running It Up
Steep-Grade Branch



One of the Signs along Main
Track, Showing Distance
to Nearest Safety Track

although four extra brakemen are employed on the downhill trip; and runaways are quite common, but their danger is altogether eliminated.

There are no bridges or tunnels on this section, nor any sharp curves, and it has, therefore, been possible to provide what

slight curves of the main track so that the down-going train runs straight onto the safety track. There are two of these safety tracks, $1\frac{1}{4}$ miles apart, and signs along the road give the distance to the nearest, so that the engineer has ample time to decide whether to let his train "take a rest" or not. The switch is normally set to run the train onto the safety track, and an "open track" signal is necessary if the engineer desires to pass the switch.

Ascending trains likewise must signal for "open track," and it is needless to say that both freight and passenger engines in going up must have a "helper" engine and sometimes two. Even so, the uphill trip requires from 15 to 20 minutes.

Since the installation of these safety tracks only one accident has been recorded. In that case an extra heavy train reached the end of the safety track and jumped off with two cars. It required two locomotives to haul the wrecking engine up the steep grade.

might be termed landings, as in a staircase, on which the momentum of a descending train is spent before it continues its downward run.

These landings consist of branch tracks, 1,200 ft. long, running uphill at almost twice the grade of the main

FIREPROOF CLOTHES FOR THE FUTURE

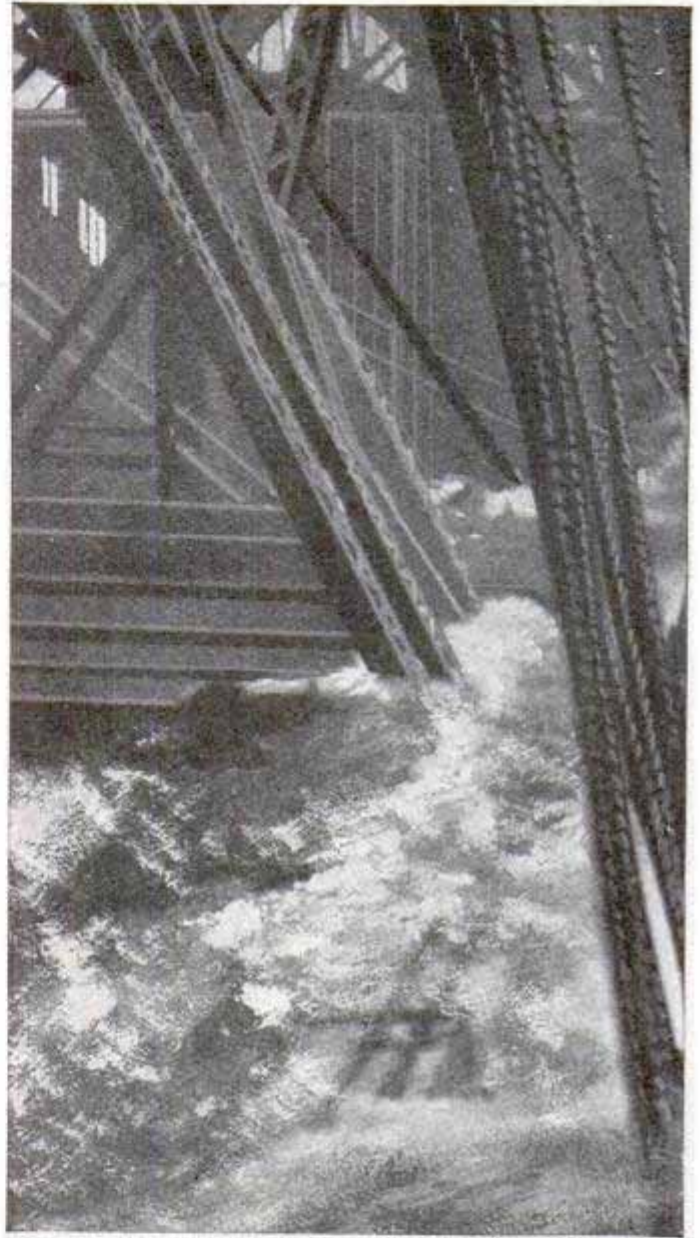
Dr. William H. Perkin, the English chemist, who has done much remarkable work on the synthesis of rubber, has now found a method of making cotton cloth absolutely fireproof, so that it will not burn even when held in a gas flame. At the same time it is softer and more beautiful than the cotton cloth from which it is made, and, the inventor believes, free from the objections to fireproof cloth heretofore manufactured.

Fireproof cotton cloth, as formerly made, was harder than ordinary cloth, more expensive, and the fireproofing material washed out the first time the cloth was sent to the laundry. The new cloth, on the other hand, is quite different. Doctor Perkin showed one garment made of it which was unharmed by 20 washings, and another which had been worn for two years and washed every week. Neither could be burned, though the latter was worn almost to rags.

This fireproof cloth costs about two cents a yard more than untreated cloth, and this may at first limit its use, but as soon as the public becomes acquainted with its remarkable properties and also with the fact that it really is as cheap as ordinary cotton cloth, since it wears one-fifth longer, it will, no doubt, find a ready market.

Not only will this fireproofed material be found suitable for the manufacture of clothes for firemen, but it may also be used by women for the finest party dresses, the most delicately colored fabrics being unharmed by the process and even given a softer appearance. For children's clothes it should be particularly desirable, since it is likely to prevent many accidents.

The new process is very simple, and consists in soaking the ordinary cloth in a solution of sodium stannate (a combination of sodium and the acid of tin), and then drying it. Then it is put in a solution of sulphate of ammonium, dried, and heated to a moderately high temperature.

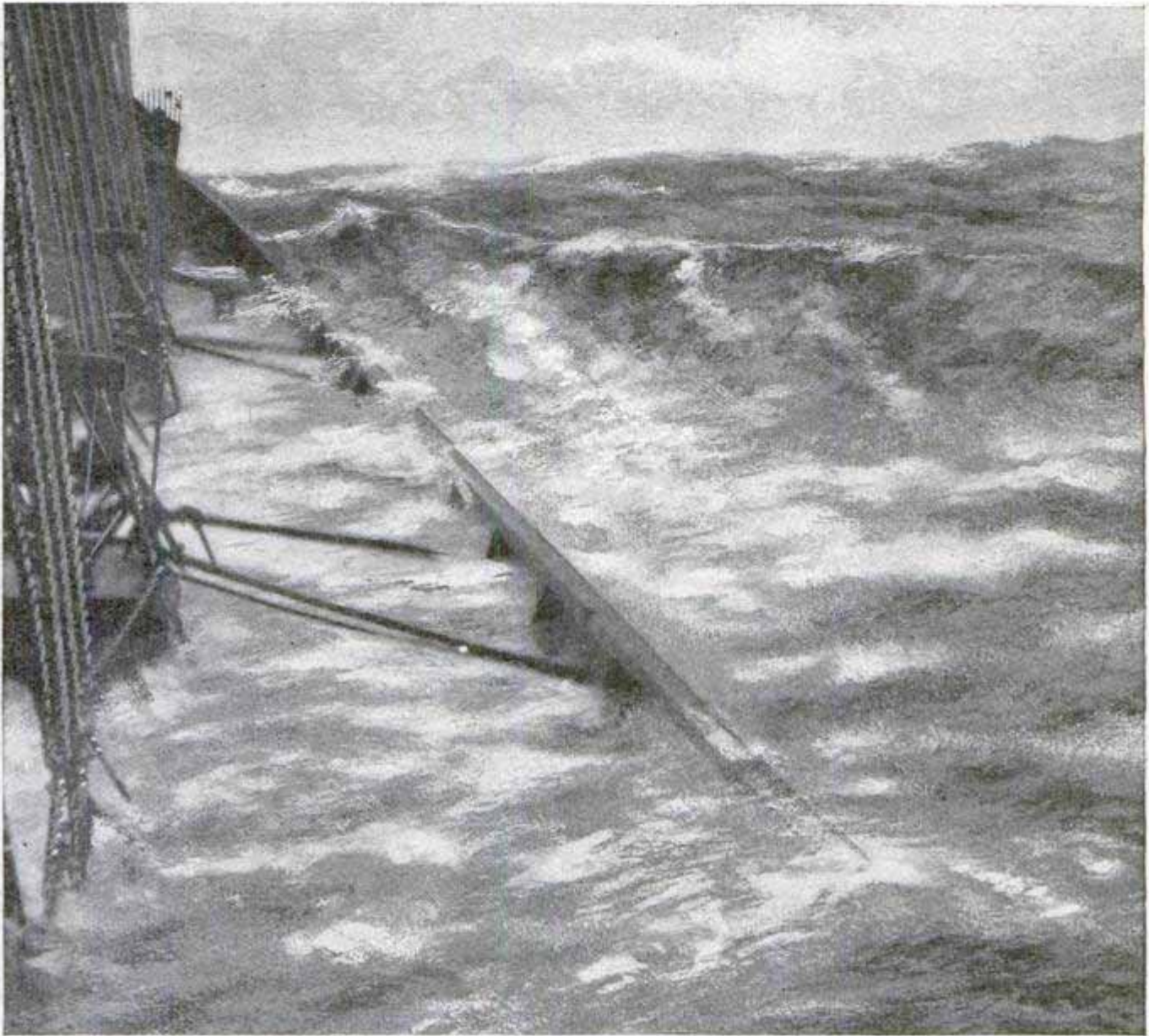


Sea Water to the Amount of 1,700 Tons
as the Heavily

"NEPTUNE" IN A HATTERAS NORTHWESTER

One of the first pictures ever taken showing to the full the tremendous fury of storms off Cape Hatteras was made by a naval attaché, who passed this fated point on the Atlantic coast aboard the big collier "Neptune" recently.

During this storm, which was not of unusual violence for Hatteras, the "Neptune," a vessel of large capacity, fully loaded with coal for the fleet at Guantanamo, Cuba, was at times almost entirely submerged in heavy seas that broke above her freeboard. It is



Was on the Deck of the Collier "Neptune" When the Photograph Reproduced Here was Taken, Loaded Vessel was Passing Cape Hatteras in a Recent "Nor'wester"

estimated that throughout the storm of 24 hours' duration, the "Neptune" had 1,700 tons of sea water in her well deck continuously. Besides her own weight, the ship had on board 12,000 tons of coal, 1,500,000 gal. of oil, and 40,000 gal. of fresh water.

Photographs taken from a position on the poop deck show great waves breaking over the ship and filling the well deck to the top of the taffrail or to a depth of fully 5 ft. At times nothing but bow and stern of the vessel were showing, and she was entirely submerged amidships.

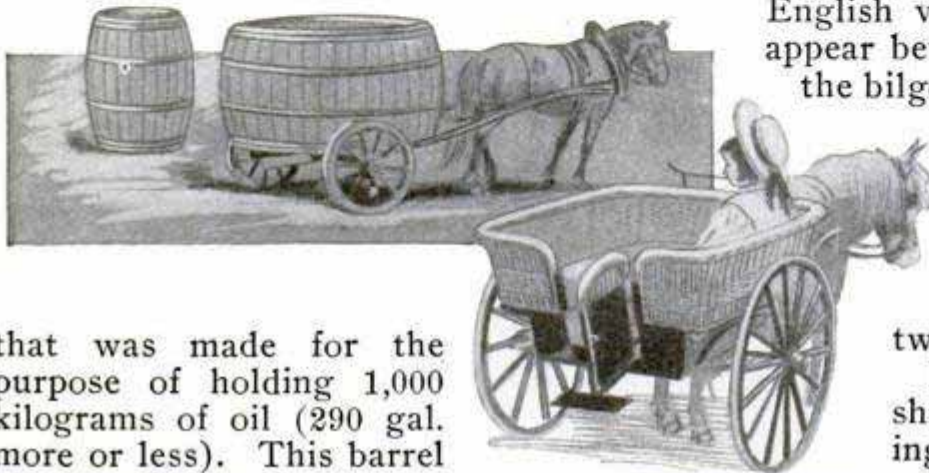
When one stops to think that the distance from the rail to the waterline of

this vessel is 18 ft. and that the sea was lashed in mountain shape to heights approximately 30 ft. from the crest of the wave to the trough, it can be more easily understood how seriously her precious cargo of life and property were involved. Had any of the hatches accidentally come loose over the coal hold, it is certain that the vessel would have been lost.

The pictures, taken with a kodak, show a great wave just breaking over the rail at the poop deck, and its predecessor racing off the bow. The storm was a "nor'wester." The iron-work superstructure shown is the Lidgerwood system, for coaling at sea.

OIL-BARREL ORIGIN OF AUTOMOBILE SHAPE

Few of the automobilists who gaze so disdainfully from the luxurious rear seats of their touring cars are aware that the tonneau in which they are so comfortably placed received its name from the meek and lowly barrel. In fact the word tonneau is the French word meaning the kind of a barrel



that was made for the purpose of holding 1,000 kilograms of oil (290 gal. more or less). This barrel was mounted on a pair of wheels and drawn by a horse. A carriage maker designed a vehicle which had the outward appearance of an oil tonneau and this carriage, known in England as a "governess" car, was referred to as a "tonneau." When the automobile was developed, the same term was applied to it because of its resemblance to the governess car, on account of the fact that it, like the governess car, was entered from the rear. The term stuck even after the rear entrance was abolished, and tonneau today is universally accepted as the proper term for the rear section of a large automobile body.

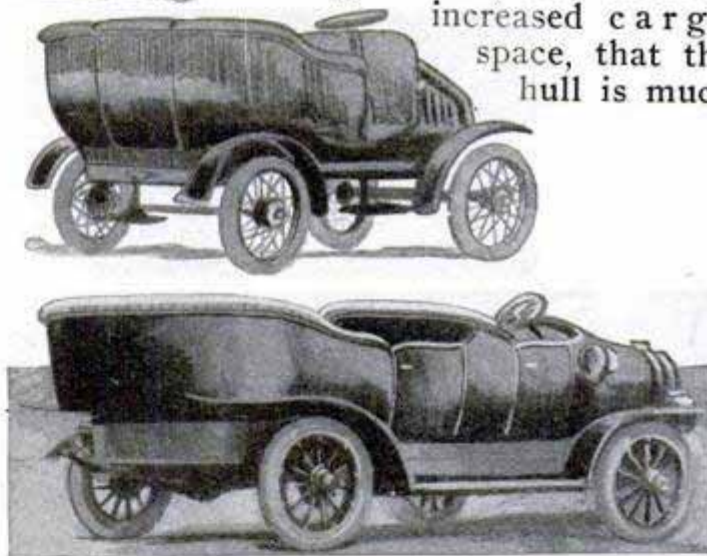
☞ An effective fish spear, recently found in use on Square Lake, Me., by a game warden, has six teeth and is constructed upon the same principle as a hanging deer trap. It can be easily set, and as soon as it strikes a fish, the jaws close upon it. It is fastened to a pole and is used like an ordinary spear or gaff, but is said to be far more positive.

CORRUGATED HULLS FOR BATTLESHIPS

Corrugated hulls for battleships have shown such possibilities for increased speed on the same amount of fuel that United States navy officers are to test out the idea this winter in Washington.

England has four such vessels, but none, either commercial or naval, has been built in this country. In the English vessels the corrugations appear between the load line and the bilge. On the recently built "Monitoria" there are two curves extending 23 in. out from the frames and a correspondingly deep concavity between them.

It is claimed that the ships so built show a saving in coal, that there is increased cargo space, that the hull is much



Evolution of the Oil Barrel to the Tonneau of the Fashionable Touring Car

stronger, and that the vessel is less sensitive to the action of the waves. Owing to the added strength given the hull by this adaptation of the tube principle, the stringer plates may be dispensed with. This increases the space available for bulk cargo and permits the ship to be unloaded more readily. Vessels so constructed are also given a better rating by Lloyds'. This is said to be one of the chief considerations. It is believed that the

added steadiness of such a vessel will provide, in warships, a steadier gun platform, with increased effectiveness of gun fire.

COLLISION OF AUTO FIRE ENGINES WRECKS HOUSE

While racing to a fire in Oklahoma City, two fire autos, one running north at a high rate of speed, collided just as the other turned north from a crossing street. The former, which was the heavier machine, was thrown from its course, striking, head-on, the supporting column at the entrance of a shop and wrecking the front of the building. The front part of the machine itself was practically demolished. On the other hand, the lighter engine, although it was spun around several times by the impact of the collision, did no dam-



Heavy Fire Auto, Thrown Off Its Course by Lighter Engine, Wrecks House Front in Oklahoma City

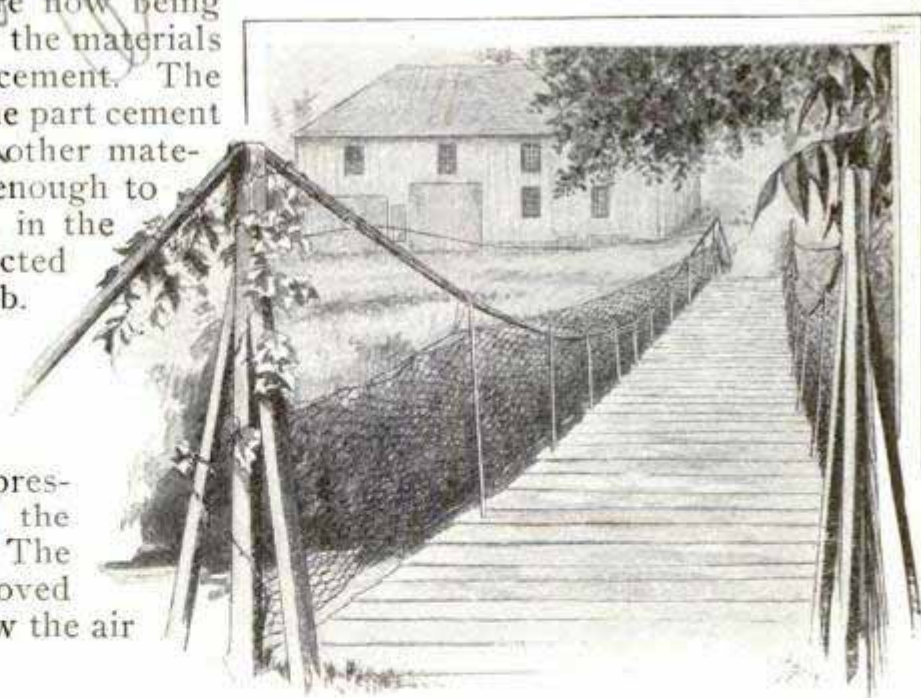
age and sustained no serious injuries. No one was killed in the accident.

CONCRETE SLABS AS FINE AS PORCELAIN

Concrete bricks and slabs, said to be as fine in grain, texture and finish as high-grade porcelain, are now being produced by grinding all the materials to as fine a powder as cement. The mixture, consisting of one part cement to as high as 12 of the other materials, is dampened just enough to pack well when pressed in the hand. It is then subjected to a pressure of 5,000 lb. to the square inch in strong iron molds, the pressure being applied in four or more strokes, in each of which the pressure is increased until the maximum is reached. The pressure plate is removed after each stroke to allow the air to escape.

DWARF SUSPENSION BRIDGE IN LONG SERVICE

Spanning a picturesque little run which forms a part of Mill Creek, a



View across Suspension Bridge Built on the Plans of the Niagara Bridge, before the Latter was Completed

One of the trains running from Chicago to Minneapolis is provided with sanitary bubbling fountains. All the thirsty patron has to do is push a button and the cold water bubbles out.

stream best famed as the one at whose mouth "Eliza" crossed the floating ice, in the Uncle Tom's Cabin tale, at Mt. Healthy, a suburban hamlet a few miles

*Europe
October 1912
P. 25*

from Cincinnati, there still remains in constant use one of the oldest suspension bridges in the country.

The old estate, on which the bridge is found, is still known, locally, as the "Lane place," for old Clarke Lane, the founder of the family here, who came to Mt. Healthy about 1813.

Clarke Lane was an inventive genius, and one of the products of his skill is this suspension bridge. It was made by him and a son—William by name—from memory, they having seen a model of the suspension bridge soon to be erected over Niagara. Bearing this model well in mind, the Lanes made their bridge, finishing it long before the other, larger bridge was completed. That they built well will be seen when it is stated that aside from a few iron girders, added to strengthen the sides, the bridge remains substantially as they left it.

WOOD FOR REINFORCING CONCRETE

Concrete beams can be successfully reinforced with wood instead of iron, if the proper proportion of wood is used, according to an engineer who has studied the problem. In many places where wood is plentiful it is difficult to obtain the iron needed for such reinforcement. He found that nine per cent of wood is needed to properly reinforce, to every one per cent of iron which would ordinarily be used.

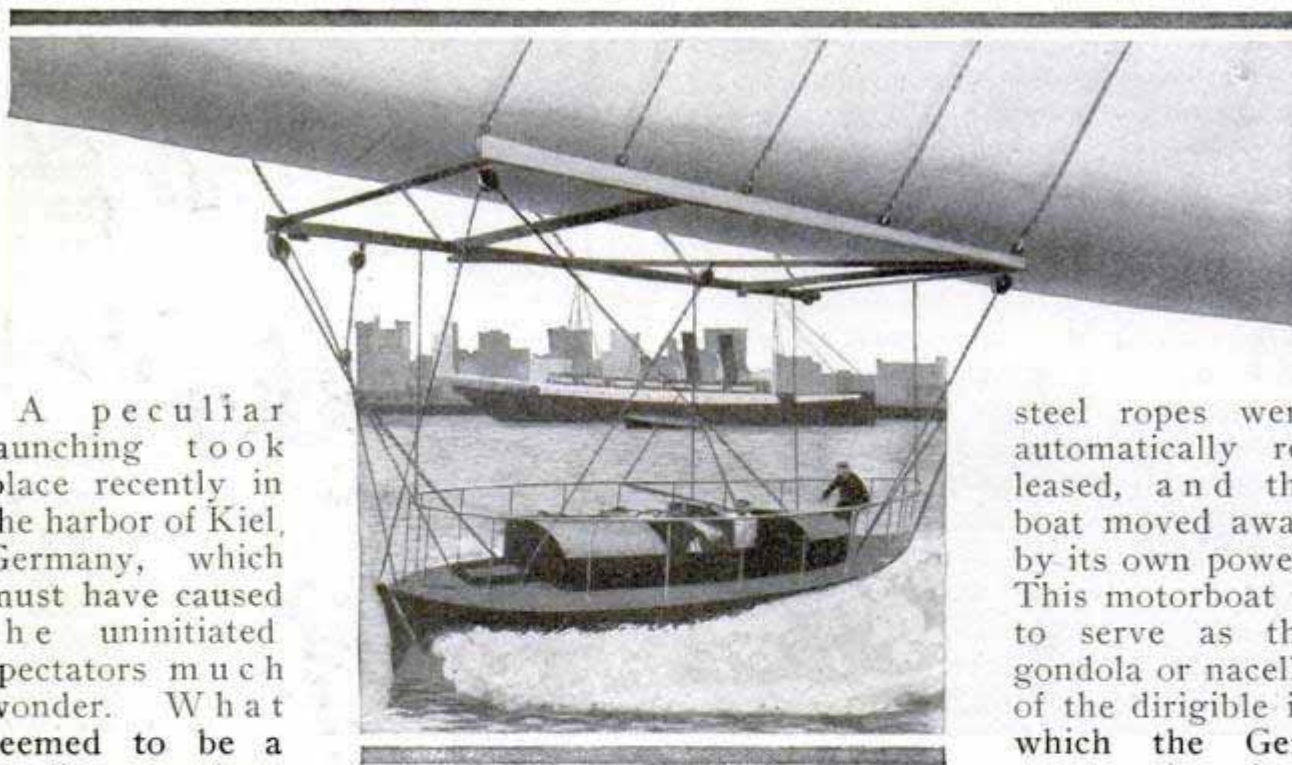
☞The first tunnel under the Pyrenees, which has just been pierced, has a length of nearly 5 miles, and when finished, will be the connecting link in a Franco-Spanish railroad from Pau, in southern France, to Saragossa, on the river Ebro in Spain.

TESTING THE GONDOLA OF THE BRUCKER AIRSHIP

A peculiar launching took place recently in the harbor of Kiel, Germany, which must have caused the uninitiated spectators much wonder. What seemed to be a small motorboat was seen suspended 15 or 20 ft. above the water by eight steel cables from a crane. Suddenly the boat was seen to drop into the water throwing a giant wave to right and left. At the same moment the

steel ropes were automatically released, and the boat moved away by its own power. This motorboat is to serve as the gondola or nacelle of the dirigible in which the German-American newspaper man,

Joseph Brucker, proposes to cross the Atlantic from Tenerife, one of the Canary Islands, to America, and the unusual launching method was adopted to illustrate the manner in which



Gondola of Airship Tested by Dropping It from Crane into Water

*Sept 20/11
d nu Lewis Sydney 65*

Brucker intends to free the nacelle from the gasbag, should such a necessity arise, and to test the automatic devices provided for the purpose.

A FORMIDABLE MUSICAL INSTRUMENT

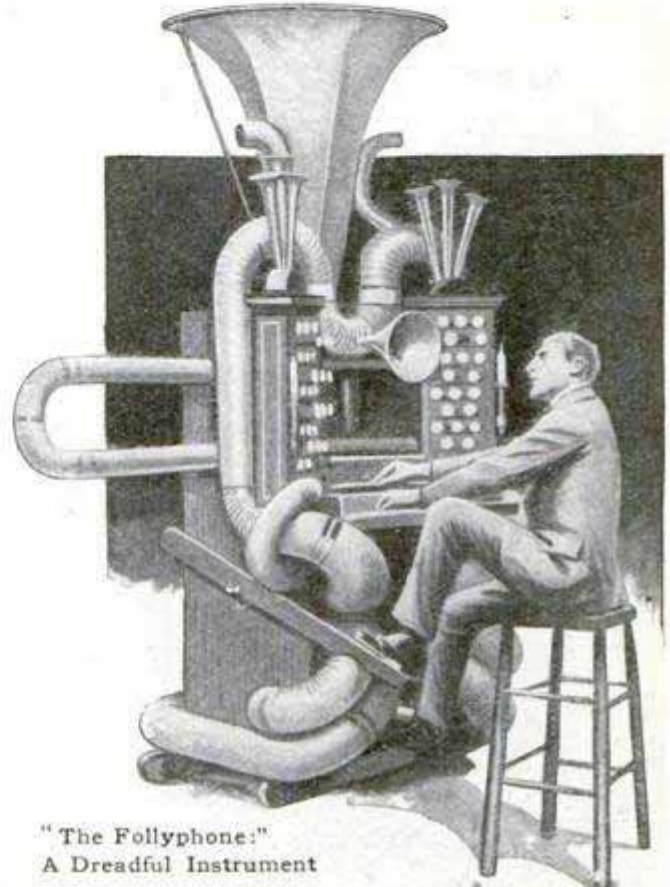
55 | All the information available about this musical instrument is that it is called a "follyphone," and that it was

BEST WOOD PULP MADE BY DULL GRINDSTONES

A study just made of methods of making the paper for newspapers or magazines by grinding up wood on a grindstone, in the government laboratory at Madison, Wis., has shown that a dull stone will make the best paper. The grindstone grinds the wood into wood pulp. If it is rotating in thick pulp, the pulp, water, and stone are kept hot; if it is revolving in water, the wood is ground in the cold. Before grinding, the log is always kept in steam for a few hours.

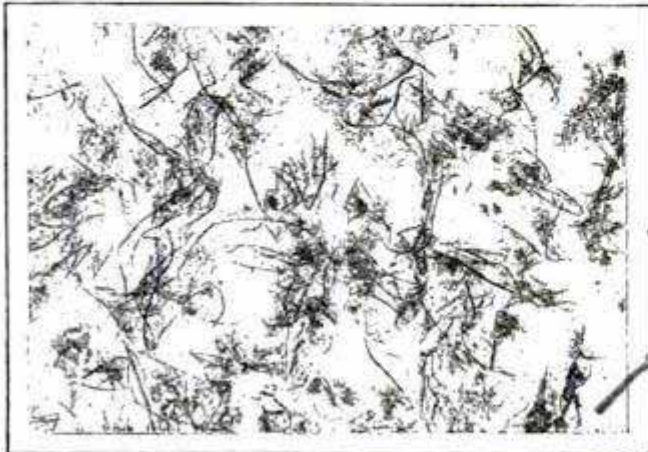
In one illustration is shown the form of the fibers which are produced when the wood is ground on a dull stone, and in the second the fibers are of wood ground on a sharp stone. In each case the figures show the fibers magnified 15 times. Even a person not expert in paper making can easily see that the fibers produced by the dull stone would make much the better paper. It takes, however, much more power to produce it.

Green wood gives a paper of a much better color than seasoned wood, and the paper is stronger if the wood is steamed before it is ground than when it is ground in the natural state.



"The Follyphone:"
A Dreadful Instrument

played with great success at Mr. Pellissier's recent esplanade concert at the Queen's Hall, London. It might, judging from the dreadful look of it, be an instrument for producing the "futurist" type of music which is so raucous that nearly all who hear it are impolite enough to hiss.



Photomicrograph of Paper Fibers Obtained by Grinding Wood on a Dull Stone



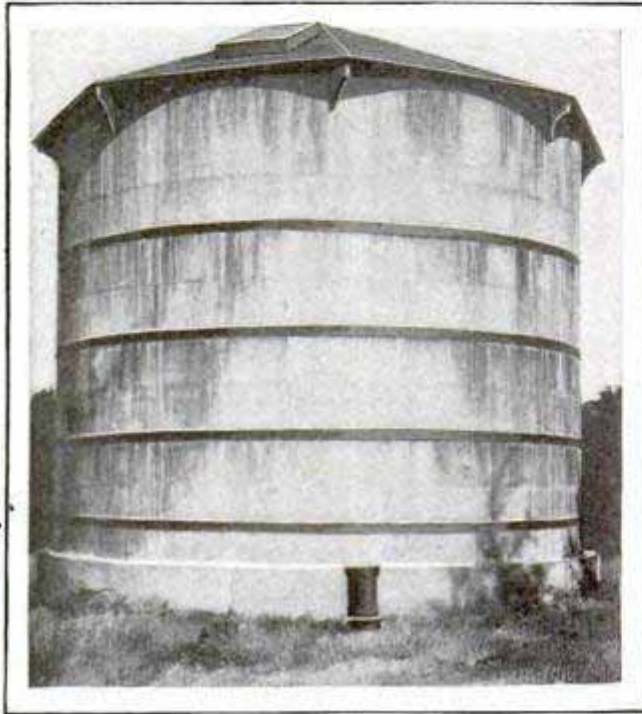
Fibers of Less Strength Obtained by Grinding on a Sharp Stone

*Photo of the Follyphone
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Feb. 18, 1912

OLD TANK REJUVENATED BY USE OF CONCRETE

677 A large galvanized-iron tank, warped out of shape, standing unprotected from heavy rains and the heat of the



An Old Iron Water Tank Which, Concreted, will See Many Years More of Service

655 sun, and abandoned as useless several years ago, was recently rejuvenated by the use of concrete. The old tank was placed upon a circular foundation of concrete, and then walled up on the inside with cement, thus being converted into a fine concrete reservoir. The only framework necessary to the operation was a large circular frame inside the tank. After the concrete had thoroughly set, the inside was given a coat of asphalt paint, and the tank was ready for water. The top was roofed over with rafters and shingles, with a suitable opening left, screened over, to let in light and air.

PASSENGER STATIONS HAVE WHITE "DEAD LINE" 771

A broad white "dead line," painted the full length of every station platform parallel with the tracks, 5 ft. from the edge of the platform and 7 ft. from the nearest rail, is an idea of one of the western railroad systems for warning employes and passengers against moving trains. General orders provide that no truck shall be allowed beyond this line when a train is moving. All trucks may be used between the line and the tracks when the train has stopped, but must be back of it again before the train starts.

There is no rule governing the movement of passengers beyond the "dead line," but it is found that the greater number of them grasp the significance of the white streak and stay on the safe side, even when the platform is crowded.

MOTOR TRUCK TO PENETRATE VENEZUELA INTERIOR

686 One of the motor-truck concerns in Ohio recently received an order from a firm in the interior of Venezuela for a 2-ton truck. The order requested that the truck be shipped "knocked down" and boxed in packages not to exceed 140 lb. each, as pack horses were the only available means of transportation inland, and each horse could carry no heavier load.

As several parts of the truck weigh considerably more than 140 lb., the maker decided to ship the machine assembled, and to attempt to send it through to the interior under its own power.

655 SUBMARINE WRECKED IN THE SURF

Submarines, out at sea, can escape the worst of a heavy storm by proceeding under water at a depth where the ocean is undisturbed, and there are many instances in which this has been

done, but when the sea is met with above a shallow, sloping beach it is a different proposition. The submarine "F1," which holds the world's record for deep diving, having descended to

*Cont. Monroe Woolley,
Dr. Art Carey Wash.*

*Herom Motor Truck Co.
Lima, Peru*



Wreck of the Record-Holding Submarine "F1" in the Breakers on Monterey Bay

a depth of 283 ft., slipped her mooring while at Port Watsonville, Monterey Bay, Cal., and ran into the breakers. Of the 17 men on board, 15 succeeded in swimming out, the two others being drowned.

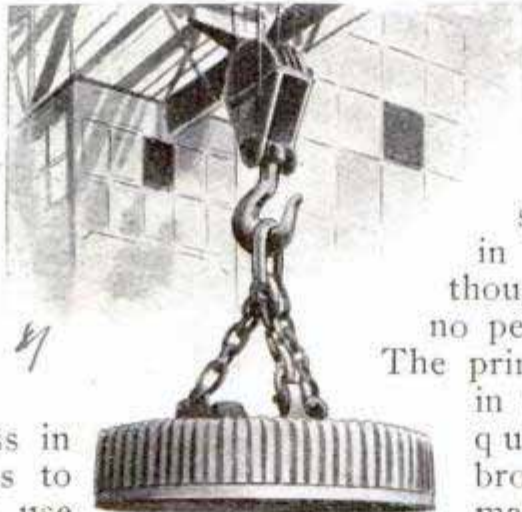
EFFECT OF AUTOMOBILES ON PASSENGER TRAFFIC

Just how great a loss in passenger traffic results to railroads through the use of the automobile is the subject of an interesting investigation by the Union Pacific Railroad. An inquiry was addressed to all the agents on the Union Pacific and Oregon Short Line, much of which is in a prosperous territory well adapted to the use of automobiles. It was found that there were over 16,000 automobiles owned along the two lines, including those in the cities of Denver and Salt Lake City, but not including Kansas City and Omaha.

Out of 50 replies from agents on the main line through Nebraska, 33 stated that the machines affected the local earnings from "slightly" to 50 per cent, while 17 reported prac-

tionally no loss. In Colorado, 16 out of 27 agents estimated the effect from slight to one-third the local business. In Kansas, 14 out of 45 main-line agents stated that short-haul business was being seriously affected, while, in Wyoming, 24 out of 31 thought the automobiles had no perceptible effect.

The principal wholesale houses in the territory were also questioned, and this brought out the fact that many houses had bought automobiles for their salesmen, and that others contemplated doing so.



JACK-AND-THE-BEANSTALK CHAIN TRICK

While the accompanying picture seems too much like the story of the beanstalk Jack climbed to be true, the photograph was taken at an electric-crane factory and illustrates in a remarkably striking manner the wonderful nature of electromagnetic force. A chain, provided with a ball of iron at one end, was anchored with the other end in the ground and the lifting magnet suspended above, until its

Railway Age Gazette.

attraction lifted the ball and chain to an upright position, the chain being held so taut that a full-grown man had no difficulty in climbing it and hanging onto its top link without bringing it down.

COALS IDENTIFIED BY COKING TEST

As important in its possible bearing on the coal industry in general as it is interesting from a scientific point of

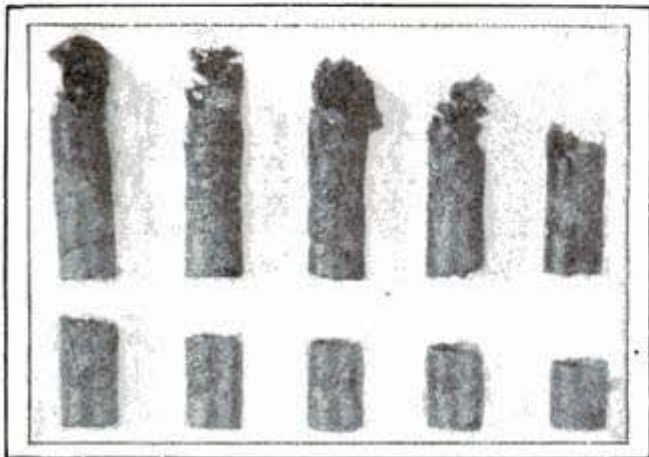


Fig. 1—Outside Appearance of Ten Different Coal Samples after the Test

view, the recent discovery by Dr. R. Lessing, London, of a simple test by which it is possible to determine from what mine or even seam of coal any sample of coal originates, is bound to arouse wide attention.

Doctor Lessing announces that his discovery was a by-product of investigations in search for a method of distinguishing coals best suited for coking from others not so good for the

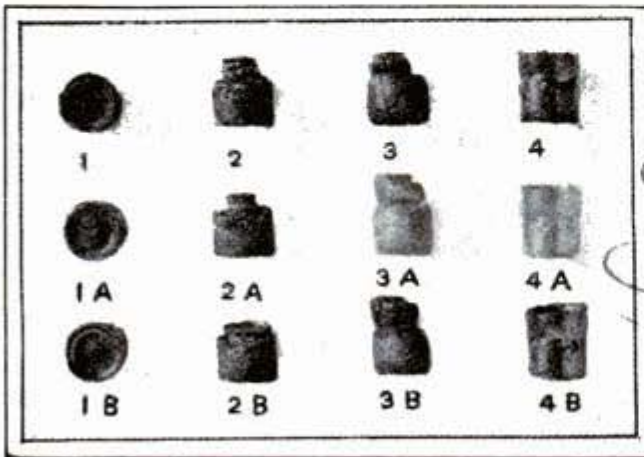


Fig. 2—Coal Samples from Four Mines Show Same Characteristics in Three Tests

purpose. His experiment was conducted as follows:

A small quantity of the coal to be tested (about 1/30 oz.) was heated in a metal cylinder, 4 in. in diameter, a piston being closely fitted on top of the coal. After heating, the coke formed, or what was left of the coal, was taken out of the crucible. It was then found that the various samples of coal looked very different after undergoing this treatment, as shown in Fig. 1, which is reproduced from a photograph of 10 samples of coal subjected to the test, each piece being easily distinguished from all the others.

It may seem that these differences are accidental, but Fig. 2 demonstrates that this is not so. Here four different samples of coal were each tested in three separate tests. It will be seen that in each of the three tests on any one sample of coal, as 1, 1A and 1B, the appearance of the test piece is almost exactly the same.

The importance of such tests is self-evident, since they will enable the buyer of coal to determine from what mine his coal has come; all samples from one mine, so long as the grade of coal does not change, giving very similar test pieces; and since it will no longer be possible for the dealer to substitute coal from another mine, or of another grade, without detection.

SMALL GASOLINE ENGINE STARTS "BIG BROTHER"

The starting of tractor gasoline engines of about 100 hp. is usually somewhat difficult, as such engines are large and heavy, due to the fact that it is impracticable with such machines to obtain great power by running at high speed, and that high power at slow speed necessitates cylinders of considerable size. To "turn over" such an engine by hand is no small task, so the manufacturers of one of the new makes of tractors are equipping them with small air-cooled engines for the purpose. The little engine drives the crankshaft of the large engine through a chain and suitable gearing.

Hammer & Co.

Hammer engine

SCOUTING THE BORDER ON A MOTORCYCLE

Since the law making opium contraband at the international boundary the price of the drug has gone so high that it puts a premium on smuggling. The government officials have been put to a great deal of trouble to detect the illegal traffic. Smugglers not only would slip over the line on foot but by train and automobile. Those in autos could open the throttle and escape with little difficulty on seeing a customs man or detective.

To meet this situation, the government has equipped the office at Blaine, Wash., with a high-speed, 2-cyl. motorcycle with which it is possible to pick up any suspected "border runner," even if he is in the fastest of automobiles. The motorcycle can go at a rate of 60 or 75 miles an hour on roads so rough that no four-wheeled machine could approach that speed, and consequently has become a source of terror to the smuggling culprits.

One of the customs detectives has

been able to seize, at different times and by various devices, \$15,000 worth of the contraband drug in operating from the one port of entry at Blaine, Wash. One haul alone of 240 tins of opium was worth nearly \$6,000. On another occasion, thousands of dollars worth of diamonds which were being



U. S. Customs Inspector Has Motorcycle for Catching Opium Smugglers

smuggled along with \$800 worth of opium fell a prey to the keen-eyed detective.

The accompanying picture shows Detective Hughes with his machine on the "line" ready for patrol duty. A batch of "dope" which he seized near this point comprised 40 tins of the opium worth \$20 per tin.

PHOSPHORESCENT FISH OF THE DEEP SEA

Certainly among the most remarkable of fishes are those which

cesses of the bottom of the deep ocean where no ray of natural light from above can penetrate. A model of one of these fish, notable for their phosphorescent organs, is on exhibition in the United States National Museum.



Electrically Lighted Model of Deep-Sea Phosphorescent Fish

are provided with lanterns of their own and which swim around the dark re-

the photograph, while in addition there is a large luminous area, like a lantern,

on the top of the head. This extraordinary creature must present a singular appearance when swimming in the dark abysses of the ocean. In the model the luminous spots on the sides are represented by buttons of glass, connected with the interior by tubes. The luminous protuberance on the head is molded in gelatin and tinted. The interior of the model is so equipped with electric lights that a distinct glow appears in the side spots, and the frontal "lantern" produces a very striking representation of the appearance of a living phosphorescent deep-sea fish.

TWO MOTION-PICTURE SHOWS IN ONE THEATER

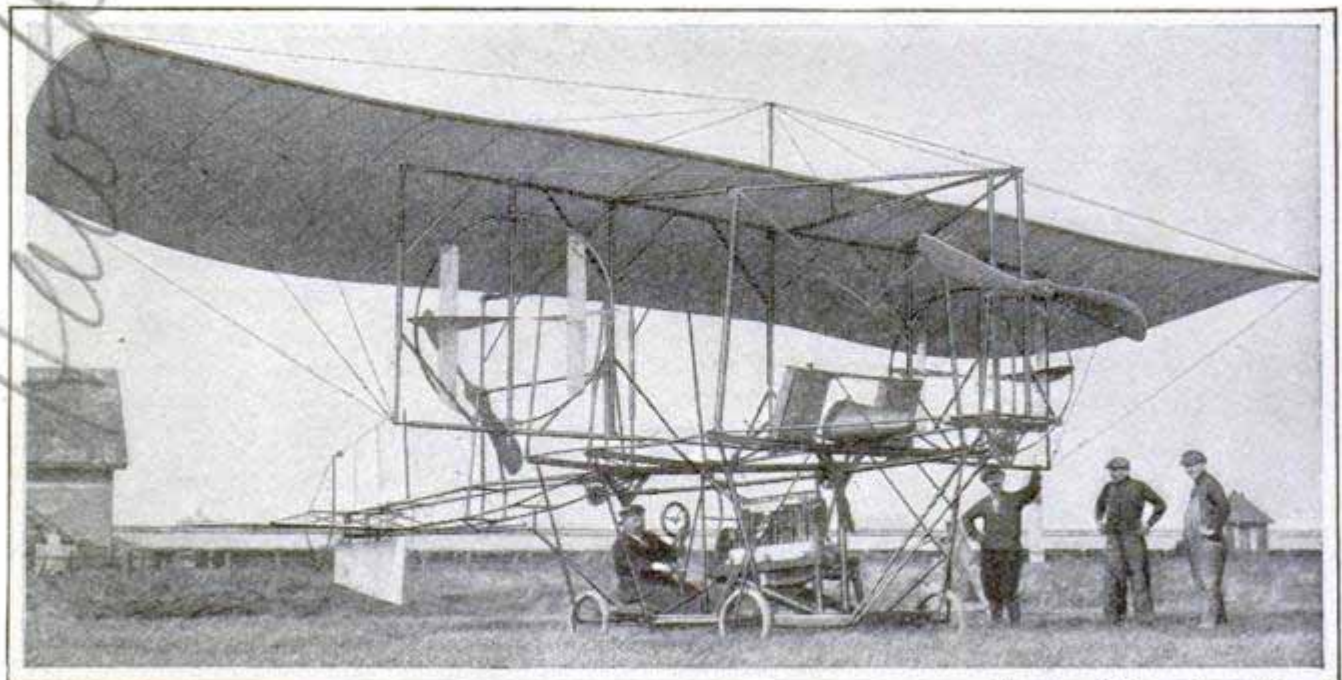
A double-show motion-picture theater, claimed to be the first of its kind, has been opened in Cleveland. It is equipped with two picture curtains or screens, and two picture machines, and two shows are run simultaneously. The patrons enter the theater and take seats on the right side, from which position one screen is in view. When the complete program has been shown on this screen, it is only necessary to move to a seat on the opposite side to see an entirely different program, and all for a single admission.

WHITE PATCHES AS WARNING TO AUTOMOBILISTS

That pedestrians, using an automobile-infested country road at night, wear white bands upon their arms, or pin a white patch to the back of the coat, is advised by the London Times in a recent editorial. This editorial also draws attention to the fact that pedestrians along English country roads are deserting the loose-gravel footpaths for the smoother tar-treated roads. This, of course, they have full privilege to do, but it is considered dangerous unless white be displayed. It is likewise suggested that the hubs and backboards of slow-moving horse-drawn vehicles be painted white, so as to be more clearly visible from an approaching automobile.

A MONO-GYROPLANE BUILT FOR OCEAN TRIP

The curious machine shown in the accompanying illustration, which its inventor, a Roumanian living in Chicago, calls a mono-gyroplane, is to be used by him, it is said, in an attempt to fly across the Atlantic. The machine measures 50 by 40 ft. and carries two vertical and two horizontal propellers. It is equipped with a 170-hp. engine.



Courtesy Chicago Record-Herald
 Flying Machine Invented by a Roumanian Living in Chicago Has Two Vertical and Two Horizontal Propellers

Alexander Kopessa

Alexander Kopessa

The Oxford at Antares

BINNACLE WITH DOUBLE LIGHTING SYSTEM

A novel type of binnacle provided with oil lamps as well as electric lighting is shown in the accompanying illustration. Both sources of illumination are located below the compass, the oil lamps being hurricane-proof and so arranged that no smoke can penetrate into the compass chamber proper, while the electric lights, contained within the binnacle, are most accessibly placed and easily regulated by means of a controlling switch to give reduced light for taking night bearings. This binnacle has been especially constructed for housing a modernized type of the so-called light-card compass, invented by Sir William Thomson, and commonly used in the British navy and merchant marine.

CORRECT STAIR CLIMBING TAUGHT CHILDREN

Teaching children how properly to walk up and downstairs is the latest physical instruction course to be adopted by American public schools. The course has been experimented with in the District of Columbia schools for several weeks, and has been pronounced by the instructors one of the most valuable ever adopted.

Avoid shuffling; ascend and descend with the body erect, by lifting the knee at each upward step, and omit awkward swaying from side to side. This, in brief, is the verbal instruction given the 50,000 Washington school children. Practical application of these principles constitutes the step-climbing course.

Under Dr. Rebecca L. Stonerod, and a corps of athletic instructors, with now and then a professional athlete, the

children first are shown how to get the most out of ascending and descending the steps, and then are required to give practical demonstrations.

Teaching children how properly to walk up and downstairs is recognized as an educational matter by the instructors. It is more than calisthenic exercises. No one can get away entirely from climbing and descending steps.

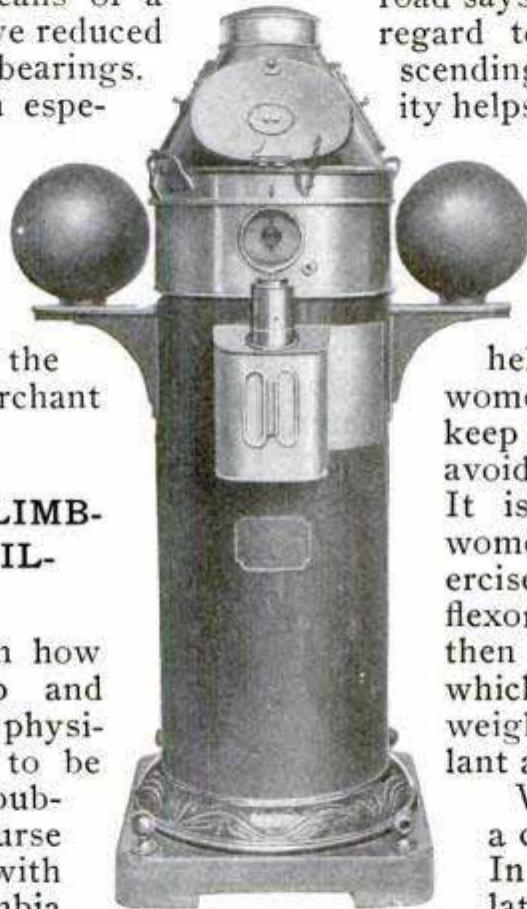
"Keeping the body erect is important in going downstairs," Dr. Stonerod says. "Few persons pay any regard to their carriage in descending steps. Because gravity helps one down, it is regarded as so easy a matter that no attention is paid to how it is done. Walking up and downstairs is a good exercise. It has been

held to be injurious to women, but it is not, if they keep the body erect, and thus avoid cramping themselves. It is as good exercise for women as for men. This exercise calls into play first the flexor muscles of the leg, and then the extensor muscles which lift the whole body weight. It is a heart stimulant and circulation inducer."

Washington is primarily a city of apartment houses. In comparison to the population and amount of space covered, there are more buildings of that character in the national capital

than in any other city in the country. For some unexplained reason, a large percentage of these are elevatorless. Consequently, the Washington resident is required to be a "walking" person. For that reason, the school authorities maintain, it is necessary that the population be taught the step-climbing and descending art.

☛The new dreadnoughts of the German navy will be equipped with 15-in. guns, throwing projectiles of 1,650 lb.



New Binnacle with Oil-Lamp and Electric Illumination

SUSTAINING LIFE WITH COLD

By AL H. MARTIN

THE next time a poorly ventilated room makes you gasp like a stranded fish, don't blame it on the lack of oxygen. Science has shattered the old time and fondly cherished theory that impoverished air is the basis of such discomforts and danger. The real danger lies in overheating the confined atmosphere, and it is now proposed to subjugate the poisonous elements of the air by cooling them. Electric fans, cold water and ice will be used in the future to aid in vivifying the so-called "dead" air.

The shattering of the old theory and inception of a new doctrine follow the exhaustive experiments of Dr. Leonard Hill, the eminent English physiologist. For years he has been endeavoring to learn the real cause of the smothering sensation attending breathing of air in a crowded theater, room, or church, and by a series of protracted tests and experiments has apparently solved the all-important question.

In constructing the modern skyscraper, the ventilating and heating engineer has considered the air question effectively solved when the chemical purity of the atmosphere is maintained and a uniform draftless summer temperature secured. The exigencies of modern city life force many people to live and sleep in veritable caves of brick and steel located below the surface of the street, with free air circulation practically impossible. Although the chemical purity of air is maintained in modern building construction, Doctor Hill noted that people living therein were enervated after a residence of a few months. The percentage of oxygen was found to be ample, and it was evident the destruction of the healthful elements of the breathed atmosphere was due to other causes. It is well known that the percentage of oxygen in the air decreases with a gain in altitude, yet mountain air is considered exceptionally healthful. Anal-

ysis of the air in the worst-ventilated schoolroom, theater or church, demonstrates that the oxygen is never lessened by more than one per cent, the ventilation through doors, windows, chimney, porous brick walls and chinks sufficing to prevent a greater diminution. Doctor Hill states that where there is only sufficient oxygen present to purify the venous blood as it arrives in the lungs there cannot be any lack of oxygen, properly speaking. Yet an atmosphere containing a plentiful percentage of oxygen may cause not only serious discomfort, but be positively dangerous to the breather.

To study the relative effects of temperature and chemical purity of atmosphere, Doctor Hill contrived a small experimental air-tight wooden chamber, fitted with large glass observation windows. On one side of the chamber were placed two small electric heaters, and a vessel containing water. This was located on the heaters in order to saturate the atmosphere with water vapor. On the opposite side of the chamber a radiator was installed, to permit circulation of cold water when it was desired to reduce the temperature of the compartment. Three electric fans were placed in the roof, so that the air could be agitated when desired. In some of the experiments, seven or eight students entered the chamber and the electric heaters were permitted to disseminate heat and steam from the pans of water. As the temperature rose, the students ceased to talk, their faces became flushed and breathing deepened. In some instances attempts were made to smoke cigarettes, but the matches went out as fast as lighted. The electric fans were then put into action, and the distress of the students was relieved to a remarkable extent. With the fans keeping the air agitated, no depressing effect was experienced from the confined air. With the fans idle, students were permitted to breathe the outside pure air

through tubes, without gaining relief from the oppressive confined atmosphere. Likewise, the breathing of the confined air by persons standing outside the chamber caused no discomfort.

In other tests, students confined in the chamber experienced no discomfort from the confined air while the fans were operated and the cold water was circulated through the radiator. The same air was breathed again and again, but the low temperature had the effect of keeping its elements in a salubrious condition. The experiments were conducted under constantly changing conditions, and always the result was the same—the deadly properties of confined air were found to originate from heat rather than from diminution of oxygen. Whenever the oppressive atmosphere was cooled, the stale air had absolutely no depressing effect.

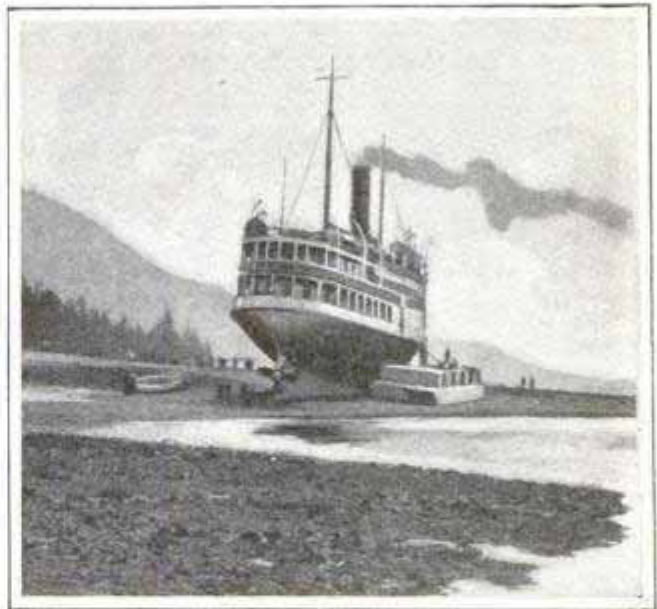
As a result of these tests, Doctor Hill predicts a new era in building ventilation. Instead of the modern method of numerous vents for air, and a stagnant heat wave, ventilating engineers will provide means for keeping the air in motion. Constant agitation of the atmosphere is more imperative than the admission of small quantities of still air, as now prevails. In theaters, factories, churches and other public buildings, the heat caused by overcrowding of people will be reduced by whirling fans, and by cold water circulating freely through the walls.

English physiologists regard Doctor Hill's discoveries as among the most important ever made in the realm of hygiene, and predict the principles involved will ere long be commercially applied.

ALASKAN STEAMER HIGH AGROUND

720

The steamer "City of Seattle" ran on the beach at high tide while running through Tongaas Narrows, near Ketchikan, Alaska, and when the tide went out was left high and dry as shown in the accompanying illustration. She rested on an even keel, and,



Alaskan Steamer Left High and Dry by the Out-Going Tide

although it was extreme high tide when she went ashore, she was floated again by the returning tide, having in the meantime unloaded some of her cargo. The large scow beside the vessel was stranded at the same time.

THE NEW MILITARY DOUBLE-SEATED MONOPLANES

727

A new seating arrangement has been developed in the construction of the English military monoplanes of the Bristol type, that is said to be far superior to the old. The customary seating arrangement for pilot and passenger on a monoplane is tandem, that is,

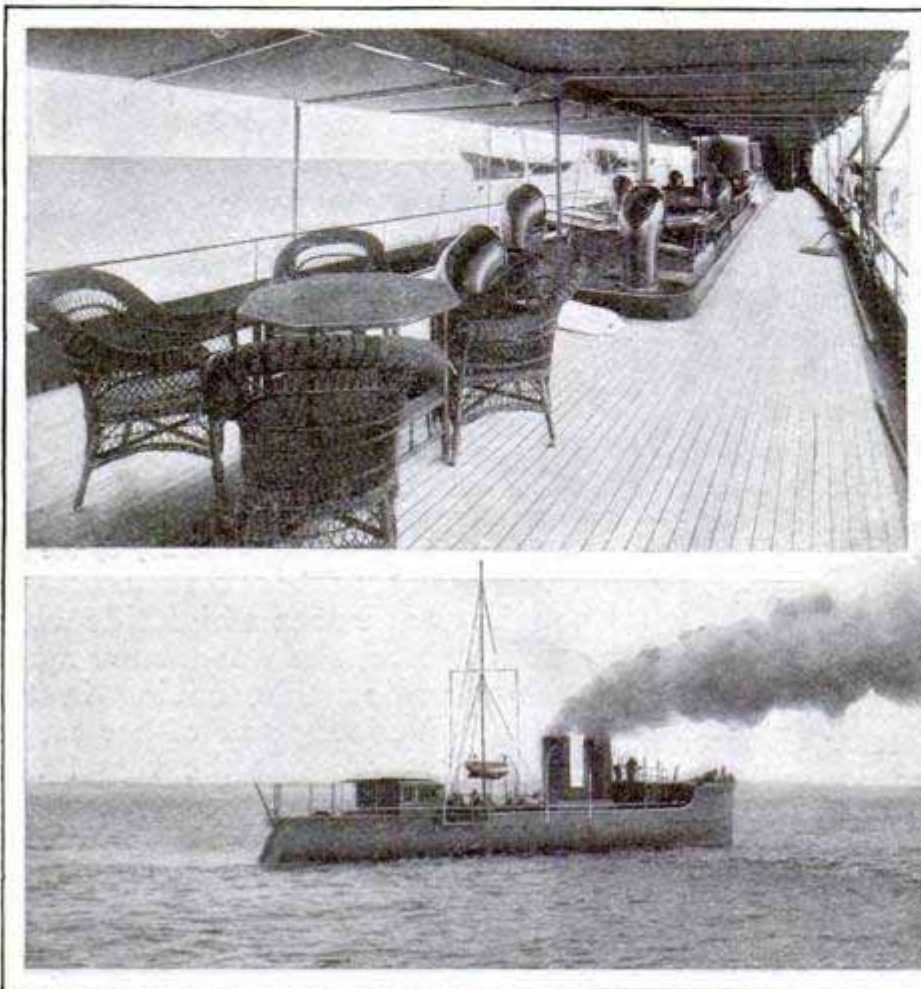


The New Seating Arrangement for Pilot and Passenger Developed in an English Military Aeroplane

Capt. Penfold, Australian Aermant
 Sydney, Australia

one behind the other. In the new arrangement the seats are side by side,

The speedy vessel is provided with a flush deck throughout, having practically a straight sheer, and for a distance of about one-quarter the length from the bow, the freeboard is raised to form an upper fore-castle, as is done in modern torpedo-boat destroyers. This type of construction provides sufficient free-



The Long Narrow Sweep of the Deck of the "Winchester" Looking Forward
The "Winchester," an Oil-Burning Turbine Yacht Having the Lines of a Torpedo-Boat Destroyer

like the front seats of an automobile. The latter arrangement gives the passenger a far better opportunity for observation.

The man in the left-hand seat in the illustration is Vincent P. Taylor, who was well-known as a parachute-descension aeronaut under the name of Captain Penfold, and who but recently took to flying instead of floating up into the air.

TURBINE YACHT RESEMBLES TORPEDO DESTROYER

The new oil-burning turbine express yacht, built for P. W. Rouss, of New York, is unusual in appearance, being 205 ft. in length, with a beam of only 18½ ft., and resembling a torpedo-boat destroyer more than any other type of craft. Her contract speed is 32 knots (36.84 miles) an hour.

board forward to allow the vessel to be driven comfortably at high speed, even in rough weather.

HATPINS CUT TO MEASURE

The menace of the protruding hatpin will become a danger of the past if a little machine now receiving publicity is adopted by the stores. This machine, which is 10½ in. high, is designed to be mounted on the store counter, and its mission is to cut hatpins to measure. When a hat is bought, it is placed on the purchaser's head and the hatpins are run through to determine the required length. The surplus is then snipped off, a twirl of the machine turns a new point in place of the removed part, another twirl polishes it, and the pin is delivered to the customer just long enough to protrude but a fraction of an inch.

Builder - Mess. Garrow & Co., Scotstoun
Paramo 60 turbine
Mess. Cox & Stevens

743

68 Rue des Journalles
Paris⁷⁵

POPULAR MECHANICS

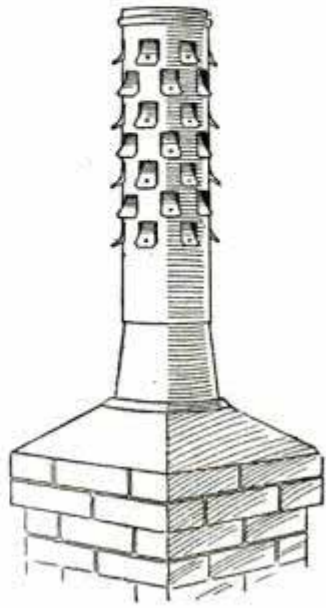
FINDING OF SILVER COINS CAUSES PANIC 636

An interesting story of how the discovery of pirate's gold resulted in more damage than the find was worth comes from New Haven, Conn. Pasquale Valenti, a laborer, dug into an iron pot in excavating for the foundations of a new building on Meadow Street, and found it filled with silver coins bearing dates of the middle of the nineteenth century. The coins, about a thousand in number, have a face value of 60 cents. Valenti had the presence of mind to rush away with the coins to a place of safety for their examination, but when he discovered the value, so the story goes, he became temporarily insane and ran through the streets until captured. When the news of his discovery became known, more than 300 people rushed to the foundations of the building, and, jumping in, began to dig. Before the police could drive them away they had dug under the foundations and caused them to collapse, resulting in damage of several hundred dollars.

On the site where the treasure was discovered, stood, until a few months ago, a house which was built in 1790.

DRAFT PRODUCER FOR CHIMNEYS 75

A chimney top designed to produce a good draft is shown in the accompanying drawing. It is of French make, and, unlike the majority of devices for the purpose, is immovable. It allows the wind, from whatever direction it may come, to enter its interior through staggered openings in its surface out of which metal tongues project. These tongues extend

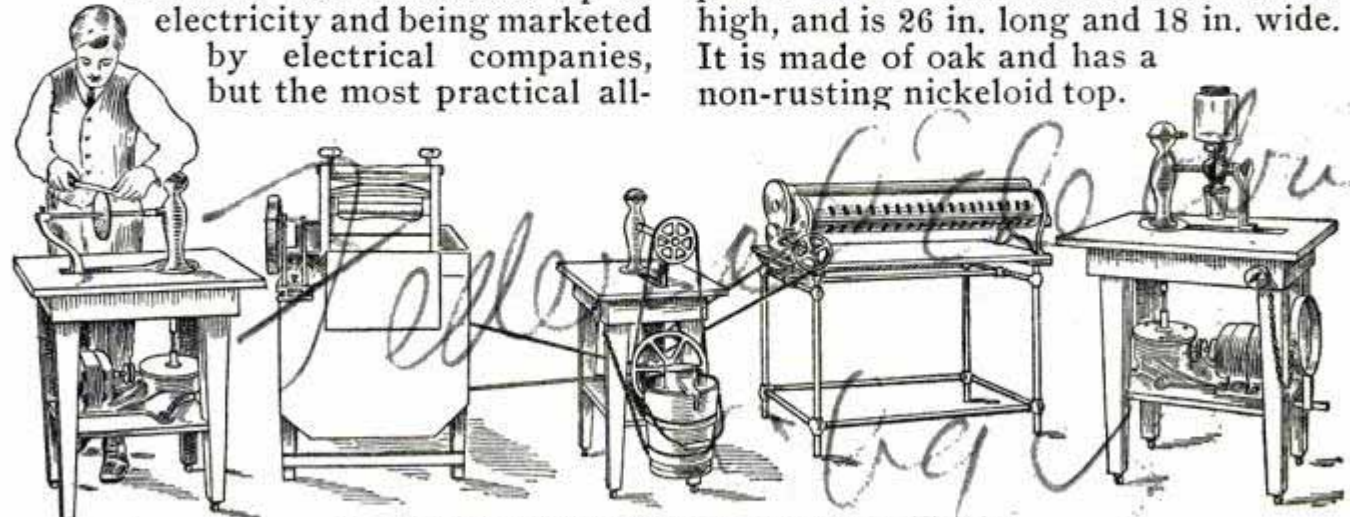


upward inside the pipe in such manner that rain falling into it is caught and carried by them to the outside, yet at the same time the arrangement provides an easy escape for the smoke and gases out of the top. The wind entering the tongue provided openings creates a strong upward draft.

15 ELECTRIC POWER PLANT FOR THE KITCHEN

Practically every machine that can be used in the kitchen or about the home is now harnessed up to electricity and being marketed by electrical companies, but the most practical all-

round mechanical assistant so far designed for the kitchen is the portable power table. This table stands 30 in. high, and is 26 in. long and 18 in. wide. It is made of oak and has a non-rusting nickeloid top.



Sharpening Knives

The Power Table Operating Ice-Cream Freezer, Washing Machine and Mangle

Grinding Coffee

Federal. Sign System

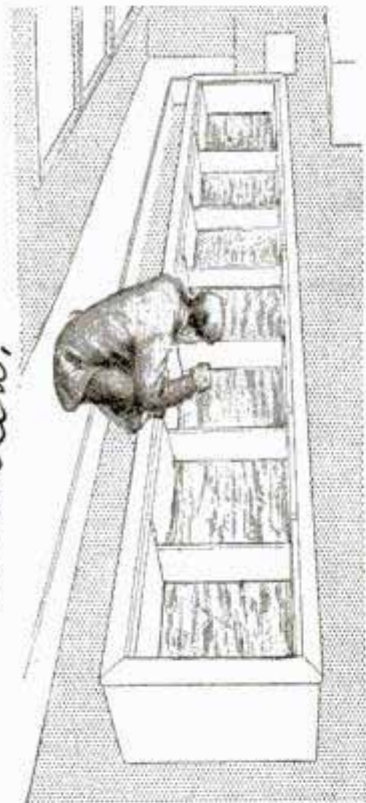
Mounted on the lower shelf, where it is protected from spilled foods and dangling apron strings, is a $\frac{1}{4}$ -hp. motor, with gears entirely inclosed by heavy metal casings.

This power table may be moved from place to place and harnessed up to the numerous utensils and machines designed for electric operation. An egg beater, coffee grinder, bread mixer,

knife sharpener, cake mixer, vegetable and fruit peeler and slicer, and like utensils, may be attached to the shafting above the table top, while the sewing machine, ice-cream freezer, washing machine, or clothes mangle may be connected up by belting. Two or three of them, for that matter, may be harnessed up at once and a large amount of work accomplished.

GLASS-BOTTOMED BOAT FOR SEA-FORMATION STUDY

363 A 50-ft. motorboat, provided with two glass-bottomed wells, has been constructed for the purpose of scientific research of the sea bottom in Bermuda waters. The boat has a width of 15 ft., this unusual breadth being for the purpose of giving steadiness while on the ocean engaged in the work of studying the sea bottom.



The glass-bottomed wells, each of which is 19 ft. long, are located on either side of and parallel with the keel. They are so arranged that a large party can study the sea formations beneath the boat at the same time. Light is thrown upon objects in the water by means of 12 fixed reflectors, and an adjustable searchlight can be let down with a cord.

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☐The fastest train in Germany runs between Berlin and Hamburg, a distance of 178 miles, at an average speed of 55.17 miles an hour.

NEW SPECIFICATIONS FOR SCOUTING AEROPLANES

The War Department has issued new specifications for scout military aeroplanes, both one and two passenger, according to which the extreme width of the supporting surfaces is restricted to 40 ft., exclusive of ailerons. This limit has been fixed because larger machines cannot be handled conveniently when shipped.

The machines for which specifications have been newly drawn will be purchased from the \$100,000 appropriation made available by the last Congress. A new wrinkle in the specifications for a two-passenger machine is a limitation of speed to 65 miles an hour. A minimum speed of 40 miles must be developed. Other specifications for this type of machine are: Control must be capable of use by either operator from either seat, machine must ascend at least 2,000 ft. in 10 min. while carrying a weight of 600 lb., including aviator and passenger, 150 lb. of gasoline and extra weight to make 600 lb. All the extra weight must be carried on the engine section during tests. The machine must be easily transportable, and the starting and landing devices capable of manipulation by one person. The engine must be of American manufacture and capable of throttling at reduced speed. An interesting test provided for this machine is that of landing and starting, with the full extra weight of 600 lb., on a plowed field. The aeroplane must be capable of executing a figure eight within a rectangle 1,500 by 750

Vide - full at Mathis Shipyards Camden.

One du Bois, Levallet - Perret

Paris, France

ft. and without decreasing its altitude more than 100 ft. at the completion of the figure. This test will be made by the aviator alone without the extra weight required during other tests.

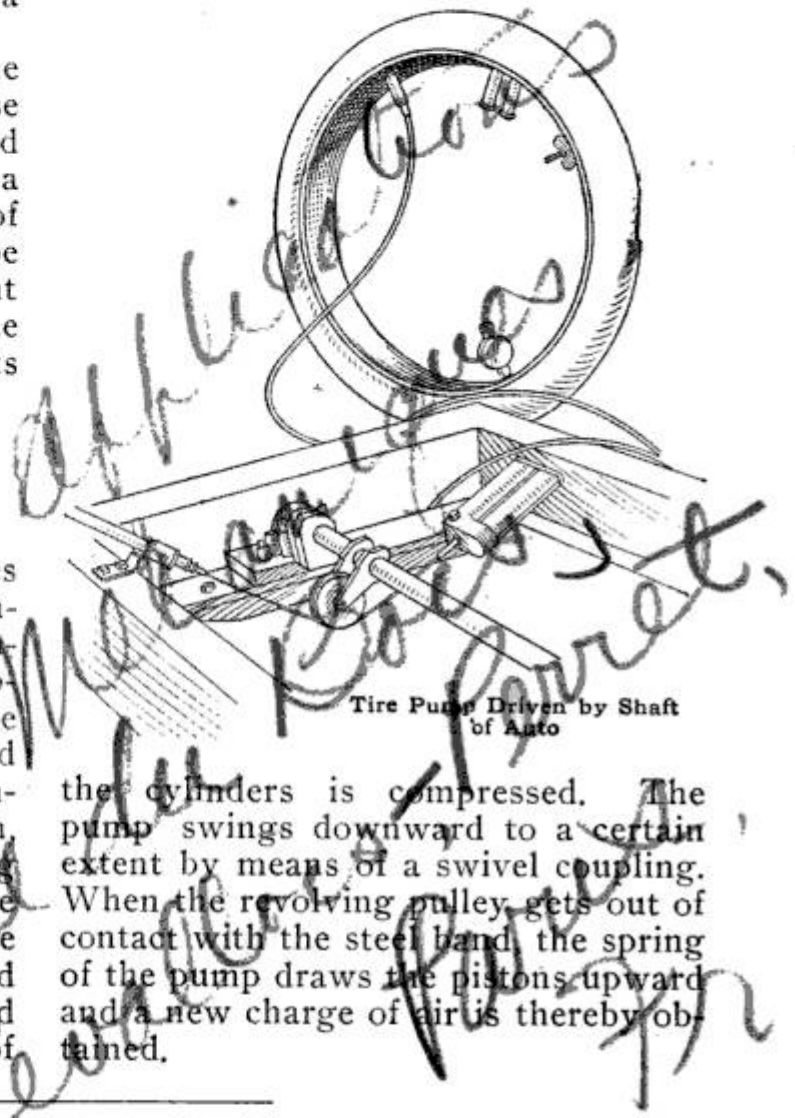
The general specifications for the new one-passenger machine comprise the following points: It must ascend 1,500 ft. in 3 min., carry fuel for a three-hour flight, develop a speed of at least 65 miles an hour and be capable of executing a figure eight within the limits prescribed for the two-passenger machine. Other tests and requirements are identical.

the pump receives the pull, which is thence transmitted to the pistons, forcing them downward so that the air in

PUMPING TIRES FROM PROPELLER SHAFT

A power pump for motor-car tires of French manufacture and very simple in design is shown in the accompanying illustration. Power is obtained from the automobile-engine propeller shaft. A pulley is mounted on the shaft so as to form an eccentric, which, once every revolution, bears on a flexible steel band running from the side of the pump to the holder at the opposite side of the frame. When the engine is started and the pulley bears on the steel band with maximum pressure, the ring of

the cylinders is compressed. The pump swings downward to a certain extent by means of a swivel coupling. When the revolving pulley gets out of contact with the steel band, the spring of the pump draws the pistons upward and a new charge of air is thereby obtained.

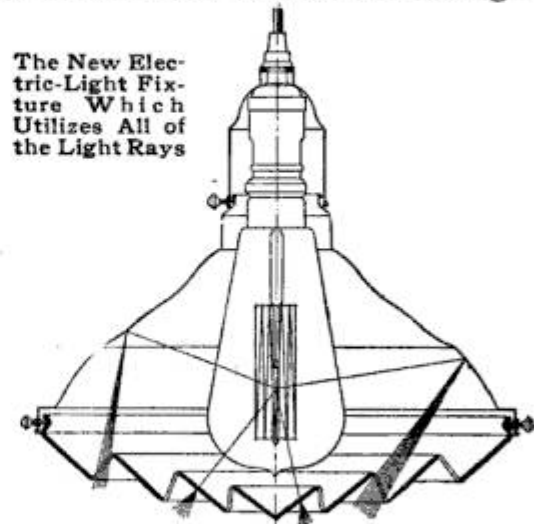


Tire Pump Driven by Shaft of Auto

NEW LIGHTING UNIT GIVES WIDE DISTRIBUTION

The combination of the three distinct requisites to obtain perfect illumination is believed to have been reached in a new shade made to be used in connection with a tungsten light. The light itself, a reflector and a diffuser are the necessary parts of all perfect illuminating apparatus, but it is seldom that they are to be found in a single unit. In the ordinary lamp there is a certain amount of reflection and diffusion, but the capacity of the lamp is limited in these respects. The bare light is frequently blinding so that it must be softened in some manner. In the new shade the principle is a combination of an upper reflector and

a lower glass distributor. These totally inclose the source of the light so



The New Electric-Light Fixture Which Utilizes All of the Light Rays

Courtesy of Electric Review and Western Electrician

that no direct rays from the filament leave the fixture without coming from

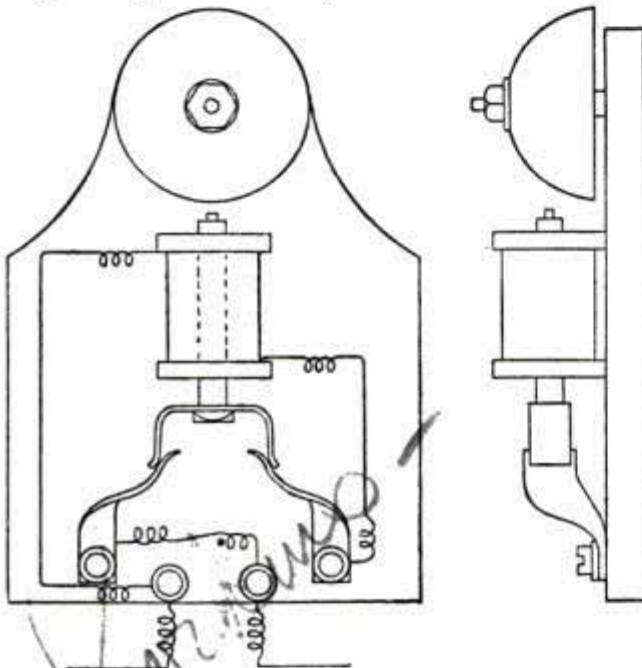
one or the other supplementary diffusing surfaces. The lower or glass-disk section of the fixture is made up of concentric inverted and erect cones. These so diffuse the light that it is distributed in a soft radiance over a wide

area. The arrangement of the surface of the inner reflector is such that practically all of the light rays are utilized in illumination, and the result is a diffusion of light practically impossible with the ordinary type of fixture.

609

AN INGENUOUS GERMAN ELECTRIC BELL

A single-coil bell of ingenious construction is shown in the accompanying diagram. In place of the usual



An Electric Single-Coil Bell Whose Core Strikes the Gong

spring-supported hammer there is a solenoid core, which is used to strike the bell gong, being raised by the attraction of the electric coil when the bell circuit is closed. As the core rises, it opens the bridge contact, and, the solenoid circuit being thus opened, the core falls by its own weight to its former position. This action is indefinitely repeated as long as the bell push is pressed. It is claimed that this bell is much cheaper than the ordinary double-coil trembling-hammer bell.

CA beryl crystal, weighing no less than 220 lb. and nearly 36 in. long, found in Madagascar, was recently presented to the French Academy of Sciences. The beryl is a semiprecious stone related to the emerald and the aquamarine.

TARGET PRACTICE OF THE ATLANTIC FLEET

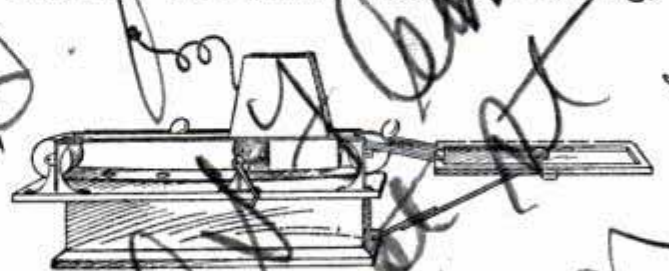
650

The target practice of the Atlantic fleet last fall embodied several important departures, which will also be maintained during the practice next spring. These include firing at real torpedo boats instead of canvas targets in night practice; firing real torpedoes, minus explosives, at real ships, and firing on the old "San Marcos" wreck at short instead of at long range.

Orders were issued some time before to prepare three of the old and out-of-date torpedo craft of the reserve division for service as target vessels. The specifications included the building up of these little vessels amidships to give them the high freeboard and general appearance of the modern torpedo-boat destroyers, and their filling with cork to keep them afloat as long as possible.

ELECTRIC "DAYLIGHT" EGG TESTER

Testing eggs outdoors or in a room having ordinary light, where eggs may be sorted and crated at the same time, is possible with the machine here shown. The outfit is about 3 ft. long,



An Electric "Daylight" Egg Tester Having Interesting Automatic Features

with a roller at each end over which an endless canvas belt moves. About 6 in. apart on this belt are small metal saucers, each of which holds an egg.

Ant. Frank C. Verheij

cloud. egg tester

Handwritten scribbles and notes covering the bottom right section of the page, including the words 'egg tester' and 'cloud'.

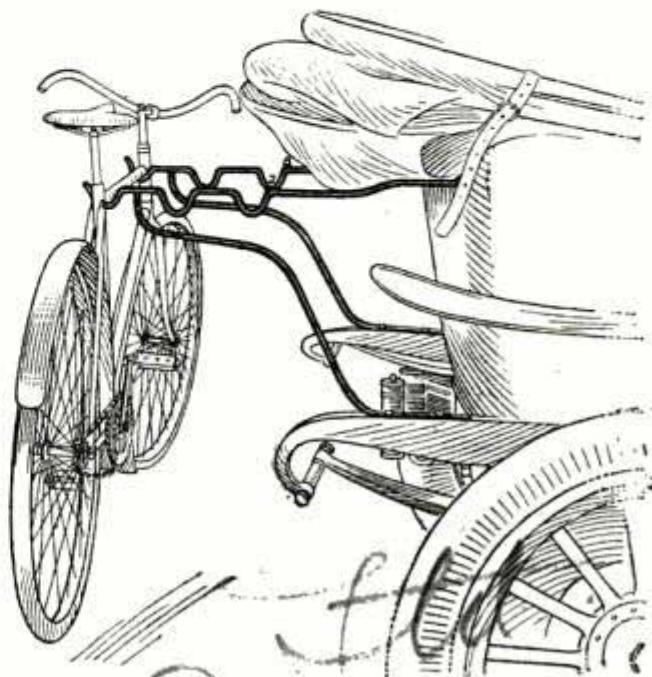
Centrally located above the belt is an electric lamp, receiving current from a regular lighting circuit, or from 24 dry batteries, and over the lamp is placed a hood having an opening in the top.

The belt is run by turning a crank, and the electric lamp automatically lights when an egg passes over it, revealing the condition of the egg to the person looking into the hood. Another interesting feature of the machine is the automatic turning of the egg upon the belt, thus enabling the tester to examine it on all sides. The age may be determined by the way the egg has settled in the shell. A perfectly fresh egg shows a clean, deep orange color, while a bad one is almost black.

As the eggs pass under the hood, the good ones are left to roll out on a canvas extension table, while the bad ones are removed by hand.

BICYCLE HANGER ON FRENCH POLICE AUTOMOBILE

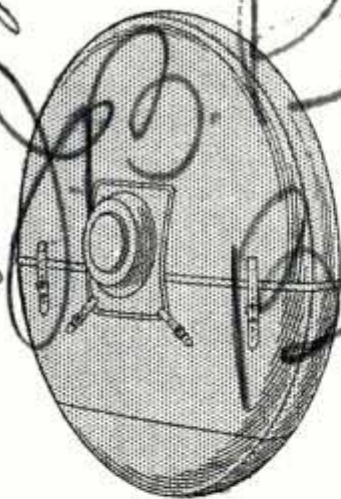
Several of the police automobiles of Paris are provided at the rear with a metal hanger on which as many as



Bicycles are Carried at the Rear of Paris Police Automobiles

LEATHER HOLDER FOR SPARE WHEELS

A neat and serviceable holder and protector for a spare wheel of either the wire or wooden-spoke variety is here shown. It is made of polished black leatheroid, and in two sections, of which the lower is slipped up, and the upper down over the wheel, overlapping the lower section. The two are then strapped together at the middle, completely inclosing the wheel and the tire.



three bicycles may be carried. When the automobile, loaded with police officers, reaches the location where a thief or other offender is to be sought, three of the officers mount bicycles and hurry to designated points presumed to be strategic in surrounding and capturing the offender.

SPECIAL TELEPHONE SET FOR PARALYTIC

An unusual telephone set was recently designed for the use of a paralytic who, except that she retained a very slight use of the arms, was absolutely helpless. The object of the arrangement was to enable the patient, should she be left occasionally alone, to call "Central" if anything happened. For this purpose, a collapsible swing arm was fastened



⌈The total length of railway in the world, according to the German Bureau of Railway Economics, is 638,611 miles, of which 326,357 miles are in America, the term America here meaning both North and South America.

Birmingham, Eng

Handwritten notes and signatures at the bottom of the page, including 'James' and 'A. J.'

near the head of the bedstead, and to it was attached a telephone set of special construction. This consisted of a regular breast-transmitter mouthpiece fitted in an inverted position at the bottom of the instrument, a head receiver and an ordinary receiver, and an electric-light switch of the pull type, which was fastened to the bed. The switch is placed in the transmitter circuit, and is not used unless the patient is to be left alone. When this becomes neces-

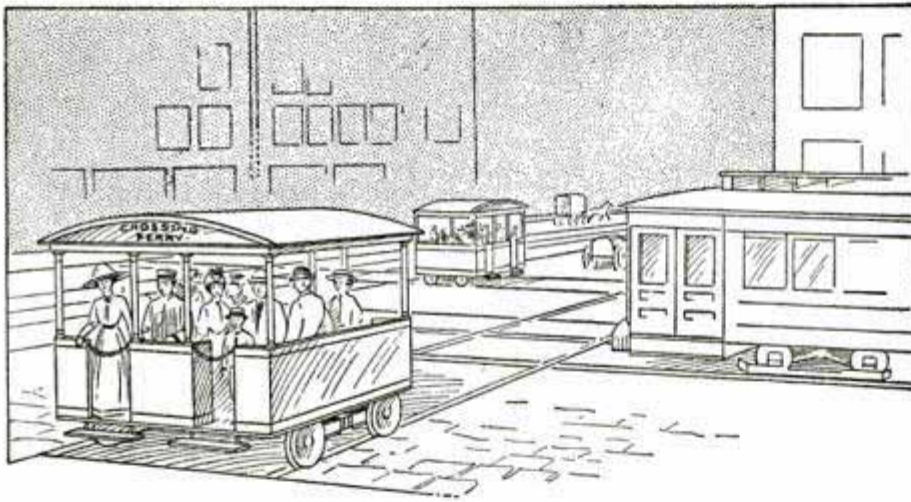
sary, however, the attendant fits the head receiver on the patient, pushes the swing arm together, until the inverted mouthpiece is brought close to her mouth, loops the cord of the electric-light switch around one of her fingers, opens the switch, and takes the regular receiver off the hook. If the patient wishes to call central, she pulls the string closing the switch. When through talking, she pulls it again, thus ringing off.

Canada
558
STREET FERRIES FOR USE AT CROWDED CROSSINGS

A resident in a small Canadian community was startled recently, when visiting in Detroit, by the way people

ELECTRICITY PUMPS WATER TO IRRIGATE RICE

The farmer has at last discovered that one of the most profitable crops he can raise is electricity and while he was slow to arrive at this conclusion, he is now carrying the utilization of the electric current manufactured in the home plant to the utmost limits. Recently there has been installed on an immense rice plantation in Texas a system of irrigation which is operated almost entirely by electricity. And the operation is performed at the central station or power



A Visitor to Detroit from a Canadian Town Suggests Crossing Ferries to Enable Pedestrians to Get Safely across the Busy Streets

were risking their lives every minute in crossing the busy streets. Realizing that the same state of affairs existed in all large cities, the idea came to him that crossing ferries might solve the difficulty. A wide platform car, negotiating the perilous passage every three or four minutes, and in which the passengers could stand, would, in his estimation, be a boon to the people, and hinder traffic less than the stream of crossing pedestrians.

house situated at the main farm buildings. With a pole line the farmer owning this place has connected a series of centrifugal pumps so that he can pump water from wells on several sections of his place at once, or on such sections as he chooses, by the simple manipulation of a switch in the power house. An oil engine furnishes the power that generates the current. One of the wells is one mile and a quarter from the power house. When water is needed, the current is turned on and the pumps do the work. When a well ceases to deliver water a new one can be sunk near it—the current from the power house being also used to operate the well-digging machinery.

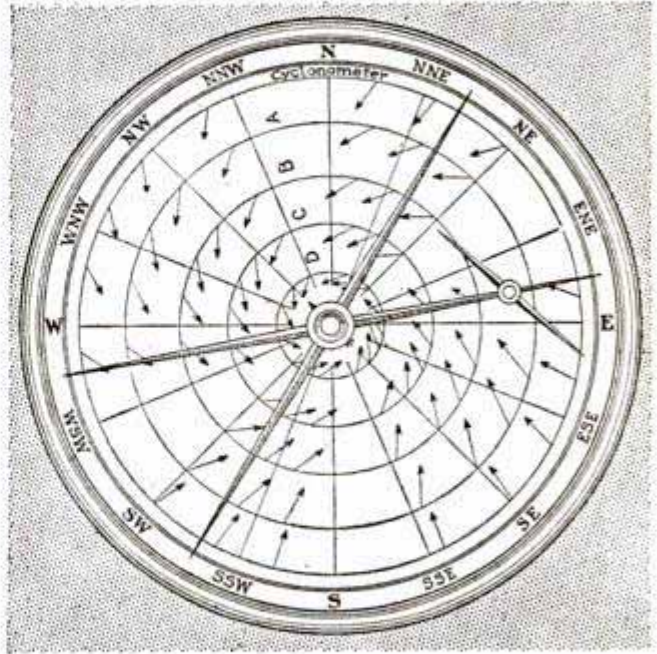
ⒸThe German dirigible "Hansa" recently set a record by carrying 42 persons, passengers and crew, on an aerial trip.

A. S. Thomas, Route 4, Leordon, And.

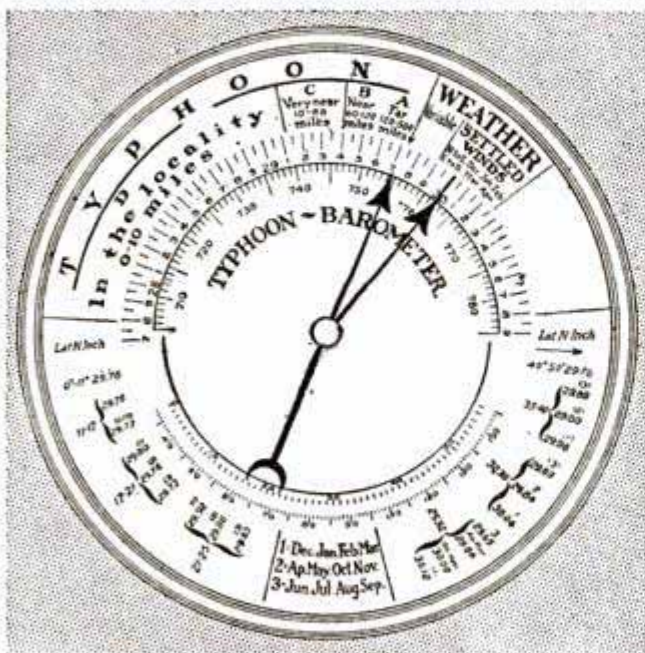
SPOTTING THE ANTICS OF DISTANT CYCLONES

A barocyclonometer, an instrument which indicates the position of the center of a cyclone at a distance of several hundred miles and permits the calculation of the direction in which the riot of wind is moving, will shortly be installed on the "Connecticut," the flagship of Rear-Admiral Osterhaus, in command of the Atlantic squadron of the United States navy. This instrument, invented by Father Jose Algue, S. J., former director of the Philippine weather-bureau service, is being made in London. It is confidently predicted by naval officers that the instrument will eventually be installed on every naval vessel. Commercial lines are also showing interest in the device and are only awaiting the outcome of naval trials before using it themselves.

Cyclones, typhoons and other storms tend to move spirally toward a vortex. The delicate instrument, which is a combination of the aneroid barometer and the cyclonometer, will enable the captain of a vessel to learn not only where the center of a cyclonic area is located, but also in what direction the destructive center of the storm is moving. Around the dial of the barometer, which is graduated in English and metric units, is a movable ring, which



The Wind Disk of the Cyclonometer, the Little Arrows Showing the Normal Direction of Winds That Converge to Make a Cyclone



The Barometer Dial Which Indicates Whether a Vessel is Within a Cyclonic Area or Not

first must be set according to directions engraved on its lower half. These have reference to varying zones of latitude and seasons, for each of which there is a definite pressure above which the conditions may be considered normal, that is, no cyclone within 500 miles need be feared. The ring is turned until a red arrow—that to the right of the segment marked "variable"—points to this normal pressure. If, as in the sketch, the barometer needle is to the left of the red arrow, the vessel must lie within a cyclonic area. The proximity of a storm being thus ascertained, the cyclonometer, by proper setting of its movable parts in conjunction with mathematical formulas and tables, will furnish a means of determining in which direction the storm center lies from the ship and in which direction it travels. By the use of the latter instrument, which is rather involved and cannot be fully described here, the captain or observer can calculate, within a very few miles, his distance from the storm center.

The instrument which will be installed on the "Connecticut" or the "Wyoming" is being made abroad, because, the naval observatory officials reluctantly admit, foreign makers of

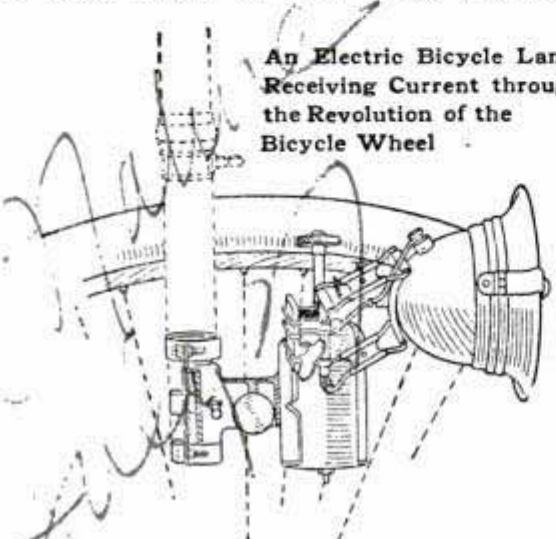
aneroid barometers make better instruments than Americans. At first, construction of the instruments was in-

trusted to German makers, but later a London manufacturer offered to do the work at a much more reasonable price.

ELECTRIC CURRENT FROM BICYCLE WHEEL

An electric lamp for motorcycles and bicycles, receiving its current through the revolution of the front wheel, is

An Electric Bicycle Lamp Receiving Current through the Revolution of the Bicycle Wheel



the invention of a German engineer. The current is generated by a dynamo, which consists of a fixed field magnet in which the armature is revolved. The shaft of the armature receives its rotary motion through a small horizontal wheel, which is in frictional contact with the tire. The complete apparatus clamps to the fork of the machine.

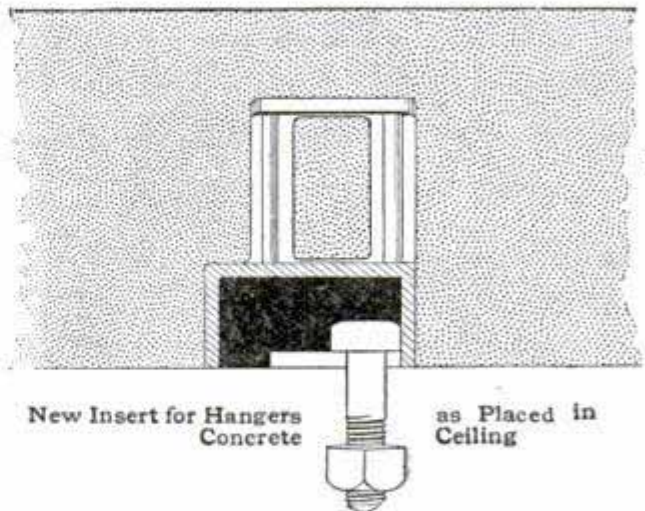
MAKING A JAWBONE FROM A RIB

We have it on good authority that the first woman was made from a man's rib, and the job was a successful one. No less successful was the work of Doctor McWilliams, as reported in the Annals of Surgery, who made or repaired the jawbone of one of his patients by splicing onto it part of one of the patient's own ribs. In this instance a portion of the seventh rib was removed by sawing it out with a chain saw, without opening the chest cavity, the necessary length being determined by a rubber-tissue pattern. The edges were freshened up and six

holes were drilled into it at various distances apart so that nourishment could get into the interior of the bone. One end was then fastened to the remaining portion of the lower jaw by means of catgut passed through a hole in the rib and through the fibrous tissue surrounding the lower jaw. The other end of the rib rested in a cavity in front of the external opening of the ear, under the soft tissues, of course. The curve of the rib was just sufficient to fill out the curve of the cheek. Two months after the transplantation, the rib had solidly united to the jaw in front, and the bone was alive and in a healthy condition. Doctor McWilliams also attempted to transplant whole joints, but in this he did not succeed, although successful results in animals have been reported by other surgeons.

NEW FORM OF INSERT FOR CONCRETE WALLS

One of the difficulties experienced in the construction of factory buildings with reinforced concrete is the necessity for careful consideration of the location of the hangers for shafting and



pulleys on the walls, in the ceilings and for foundations in the flooring. Up to the present time considerable

La nature 7/27/12

Wayton Gannery Steinmetz

annoyance was caused in placing inserts of the ordinary type because of the difficulty experienced in getting proper adjustment after the concrete had set. A form of insert made of cast iron has been devised which does away with this trouble. The new insert is so made that the bolt placed in it to secure the machinery in place can be adjusted in any way desired, and at the same time the device will be so firmly held by the concrete that the bolt itself will break before the insert will work loose. As shown in the illustration, the insert is securely imbedded in the concrete and, once in place, will not loosen.

A "FORE-AND-AFT" DIRECTION INDICATOR

A direction indicator, operated by a foot arrangement, and having a dial at the front of the automobile as well as at the back, is shortly to be manufactured in Canada. The method by which the hand of each dial is turned to indicate that the car is to continue ahead, turn to the left or right, or stop, is shown in the diagram. At night, green, red and white electric lights are used to indicate what course the car is going to take. The operation of the indicator does not interfere with

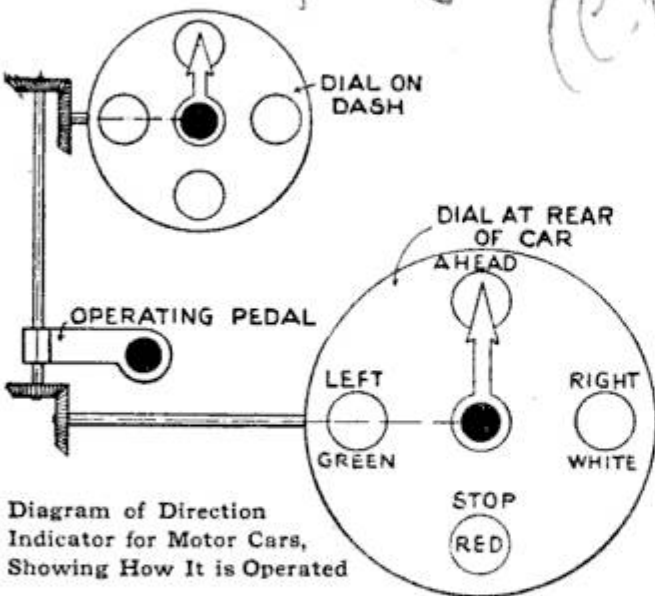


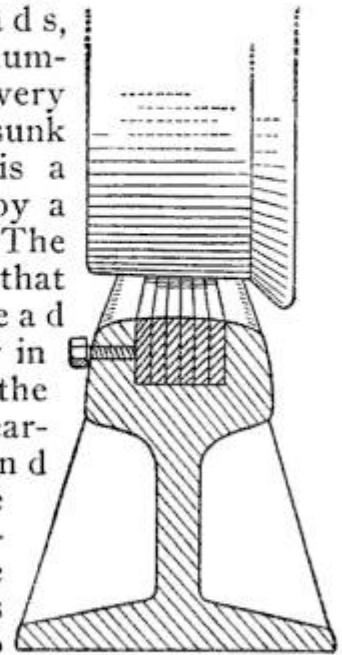
Diagram of Direction Indicator for Motor Cars, Showing How It is Operated

the operation of the car, as its warning is supposed to be given a minute or two before the actual movement indicated is performed.

Ans. H. H. Truett

EXCHANGEABLE HARD-STEEL TREADS FOR RAILS

Rails with exchangeable treads, consisting of a number of strips of very hard steel alloy sunk into their head, is a recent invention by a French engineer. The object is to make that part of the head which is normally in contact with the wheels more wear-resisting, an end which cannot be attained by hardening the whole rail, for the shocks and stresses to which it is subjected make it imperative that it be of not too hard steel. The new rail is made in two forms; one, as shown by the sketch, for light traffic, having the hard-steel strips sunk into the head and held by setscrews; the other, for heavy traffic, consisting of three parts bolted together, the strips being held between the two parts of the head. Another feature of this rail is that the hard strips may be so laid in, that web plates, holding the ends of two lengths of rails together, become superfluous, thus insuring shockfree, smooth and noiseless running.

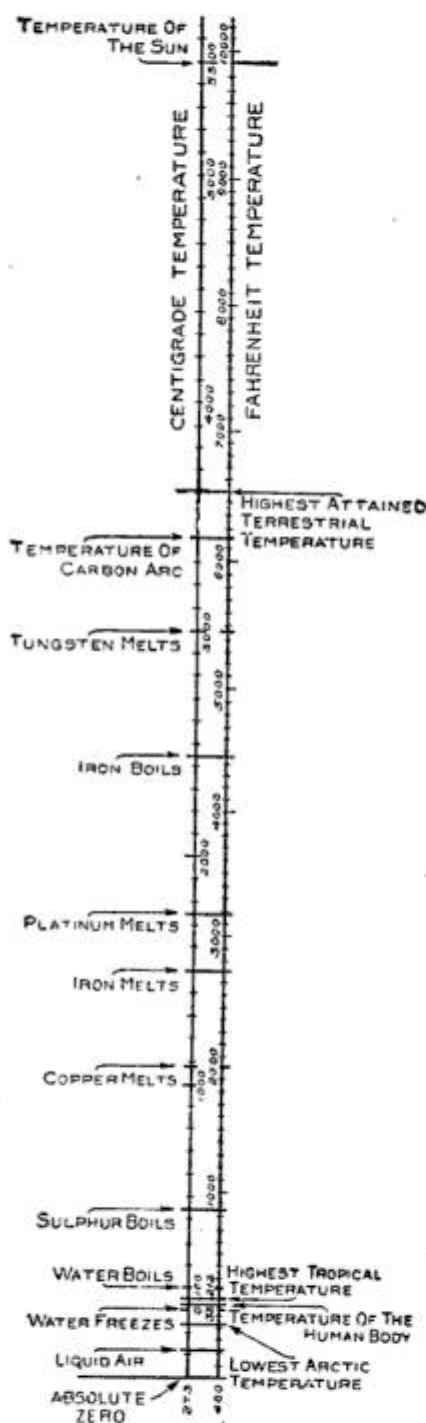


GYROSCOPES TESTED ON U. S. DESTROYER

The gyroscope method of preventing the rolling of ships is being tested out by the U. S. Navy on the torpedo-boat destroyer "Worden." Two gyroscopes were placed on the main deck forward, one on the port and the other on the starboard side. The type of apparatus being tested on the "Worden" was invented by a naval officer, and is said to be far more active and satisfactory in its effect than the gyroscopes used with considerable success on several German vessels.

THERMOMETER REPRESENTS COSTLY RESEARCH

The thermometer which is pictured on this page is not a real thermometer, but a device used by Dr. J. A. Harker,



so commonly used in electric lamps, very large errors were made. Some measurements made not longer than two years ago were nearly 1,000 deg. off, while the results obtained this year are probably not more than 100 deg. wrong.

Supposing a thermometer used to measure the temperature of some ice

water, which, as nearly everybody knows, is 32 deg., should register the temperature of the ice water as 1,000 deg.! One would not think much of that thermometer, but such mistakes were made by the best scientists only a few years ago at temperature ranges between 5,000 and 6,000 deg. Beside the scientific value, it is actually a matter of dollars and cents to be able to measure such temperatures accurately, and hundreds of thousands of dollars have been spent in the work represented by this "thermometer."

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In explanation of the thermometer, it should be noted that at the bottom the temperature is given as 460 deg. F. below zero (equaling 273 below zero centigrade), which is the theoretical point at which heat ceases to exist. One of the most remarkable scientific achievements of the year 1912 was that of reaching a temperature only 2 deg. F. above this so-called absolute zero, which was done by Prof. H. Kamerlingh Onnes, of Leyden, when he succeeded in liquefying the rare gas helium, this low temperature being developed at the subsequent evaporation of the liquid helium. This marks the low limit of temperature so far obtained on the earth. The highest temperature ever attained is that of an electric arc, produced in a closed vessel containing gas under enormous pressure. The temperature so reached was 6,500 deg. F. Thus by artificial means man is able to change the temperature about 7,000 deg. A glance at the thermometer will show that this is a very great range compared with the natural range of temperature on the earth, from the lowest arctic to the highest tropical. The heat of the sun, according to Doctor Harker, is 10,000 deg., or 3,500 deg. higher than any artificially produced temperature.

CA new Zeppelin-type dirigible, being built for the French army, is designed to carry fuel for 60 hr., to have a speed of about 56 miles an hour, and a radius of action of from 1,600 to 2,000 miles, depending on weather conditions.

**GROWING TROPICAL FRUITS
IN WASHINGTON**

The United States Government's first attempts to grow a variety of tropical plants to the fruiting stage are being made in Washington in a mammoth greenhouse just erected. With a view of giving the federal plant experts in Washington an opportunity of studying the growth of the tropical plants and fruits, transplanted in a northern clime, and at a much closer range, the government has spent thousands of dollars in the erection of the greenhouse.

Hitherto, the foreign-plant office of the Department of Agriculture, which has greenhouses all over the country, has devoted its time to growing the plants only. After these have reached the stage where it is advisable to remove them, they are distributed. The new plan is to allow the plants and trees to remain in the greenhouse in Washington until maturity. A new house, 15 ft. high at the center ridge, has been constructed for this purpose, and the trees can spread their branches as far as necessary. Practically all tropical fruits claiming Central America as their place of nativity, as well as scores of trees from tropical climes of other countries, are being nurtured. The only collection of growing tropical fruit trees of any consequence in any North American city is that now operated in Washington.

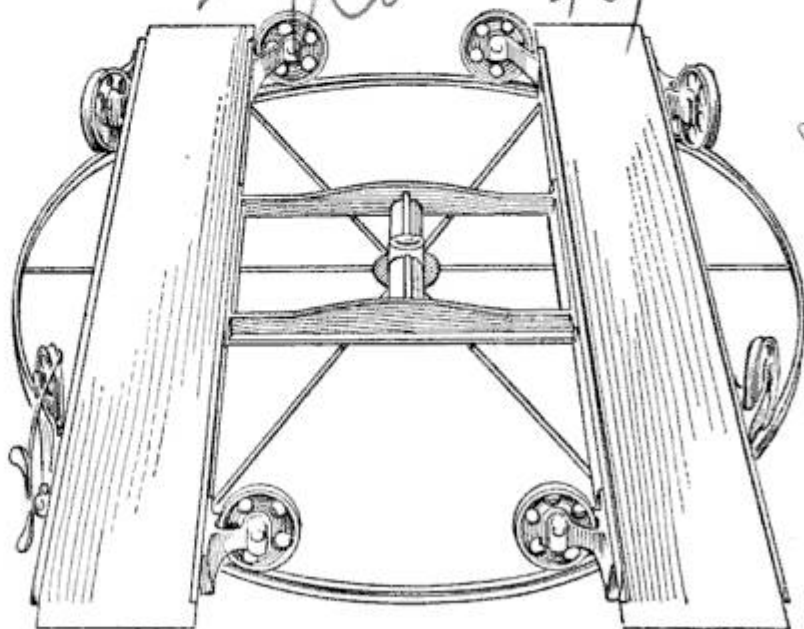
See Beetles, Cigar July 14-77

**585 X-RAYS USED IN CIGAR
MANUFACTURE**

One of the new and interesting uses found for the X-ray machine has to do with the making of clear-Havana cigars. Its purpose is the discovery and extermination of the tobacco beetle. It is said that the special apparatus has given perfect satisfaction.

**PITLESS TURNTABLE FOR
AUTOMOBILES**

A pitless turntable, designed especially for private garages and for automobile salesrooms, is meeting with



Pitless Turntable for Garages and Salesrooms

considerable favor. The turntable comprises a circular base, braced by diametrical stayrods, and two narrow runways attached to a frame which is pivoted to the center of the base. At the ends of these runways, which are set just the required distance apart to receive the wheels of the automobile, are ball-bearing casters, which run on the track provided by the smoothly ground surface of the circular base.

**BOATS FOR PARIS STREETS
IN CASE OF FLOODS**

The exceptional wetness of last summer has reminded Paris that there is a possibility of the repetition of the disastrous floods of 1910, particularly as the \$4,000,000 raised for protection has been spent, principally upon repairing the damage caused by the last floods, and but very little of it devoted to works of protection. The head of the Paris police department, however, has made arrangement to organize a service of boats, should street navigation become necessary.

*Pitless Auto Turntable Co., Inc.
1376 W. 9th / Kansas City, Mo*

*The Engineer
20 11 12*

Herr Von Busch
TRAFFIC SEMAPHORES FOR BUSY CROSSINGS

An aid for the traffic policeman, in the form of a semaphore, is shown in the accom-

45
Schuman well
172 C. Ford
Wye
panying drawing. It comprises a standard 4 ft. in height, the base of which, in actual service, is to be imbedded in the asphalt or other pavement surface; a rod rising 4 ft. above the standard, and a "Go ahead" and "Stop" sign attached to the rod at right angles

to each other. The "stop" sign is painted a vivid red, and the other is painted green. The rod carrying the signs is caused to turn, presenting the signs first in one direction and then the other, by means of a lever of the pump-handle type mounted on the standard within easy reach of the policeman in charge.

636
DISTRIBUTION OF THE "TITANIC" FUND

The great fund for the relief of the dependents of the victims of the "Titanic" disaster, and known as the Mansion House Fund, is to be distributed in the following manner, if the scheme submitted to the Mansion House Committee by C. J. Stewart, the public trustee, is adopted. The fund, amounting to \$2,070,500, will be used for the benefit of 2,296 persons. The basis of calculation for the distribution of the fund is that the widows or other de-

pendents of the sailors and officers who went down in the "Titanic" should receive a weekly grant approximately equivalent to half the victim's income. This basis is easily applicable to the members of the crew, but in regard to the passengers the difficulty was much greater. There are claims from the relatives of first-class passengers, for instance, which prove that the victim was in receipt of a considerable income, although he had not taken the precaution to insure his life or otherwise provide for those dependent on him, with the result that they are now destitute. In such cases the half-income basis is inapplicable, so it is proposed that the maximum weekly grant to a childless widow be fixed at \$10, and the minimum at \$3. If the victim of the disaster left one child, the allowance to the widow or other dependent will be increased by about 90 cents per week; if two children, by \$1.40 per week; and if three or more, by \$1.75.

The proposed annuities are, generally speaking, for life, but there are some exceptions, however, such, for instance, as remarriage of the widow. In the case of children, the allowance will, as a rule, cease when they have attained the age of eighteen years.

COMBINATION TWENTY-FOUR AND TWELVE-HOUR WATCH

Because of the recent adoption of 24-hour time in France, the French timepiece makers are turning out watches having combination dials and three hands.

The main dial carries only hour numerals from one to 24. In front of this dial, and slightly raised above it, is a smaller dial having just the 12 hour numerals and minute divisions of the ordi-



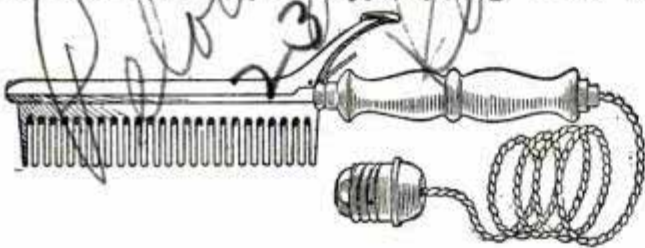
Magazine
15

nary watch. The dials, of course, have individual hour hands, but the minute hand of the smaller dial suffices for both.

As shown in the illustration, the hands of the 12-hour dial indicate that the time is 3:34 o'clock. The hour hand of the 24-hour dial has passed the numeral 15. This, with the minute hand of the 12-hour dial, shows the 24-hour time to be 15:34 o'clock, the fact that the hour number is higher than 12, showing that the time indicated is in the afternoon.

COMBINED ELECTRIC COMB AND CURLING IRON

A new combination in hairdressing implements, consisting of an electric comb and curling iron, is now being marketed. The comb, which is intended for use in drying the hair, is



An Electric Curling Iron with Comb Attachment for Drying the Hair

heated by means of the heating element within the curling iron proper, and when the device is to be used for curling, the comb portion can be readily detached. The temperature is automatically regulated, and it is claimed that there is no possibility of burning the hair. *Palouze mfg B.*

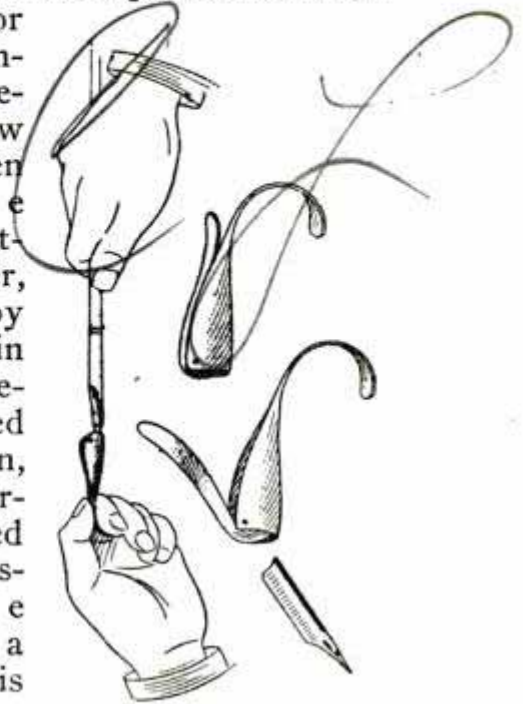
VENTILATORS SCREENED TO KEEP OUT FOG 638

The dense fogs of London and other English cities interfere to such an extent with proper indoor working conditions when any opening is allowed for its entrance, that the electric fans used for drawing in fresh air are equipped with fog screens. Where electric ventilation fans are installed, the windows are kept closed, particularly during fogs, all the supply of fresh air entering by way of the fans.

James Keith - Blackman Co.

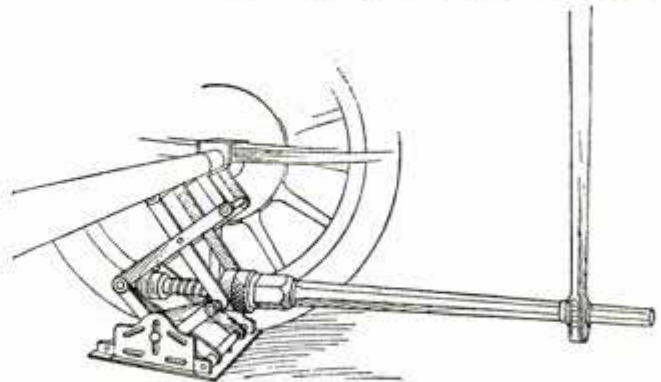
PEN-PULLING DEVICE

A simple but effective device for removing the pen from a penholder without bending or otherwise harming the point, regardless of how solidly the pen may have wedged or rusted in the holder, is being sold by novelty stores in Paris. The device is slipped over the pen, the lever portion is pushed down by pressure of the thumb, and a steady pull is exerted. The outer end of the pen puller terminates in a bend, which provides a substantial fingerhold.



AUTOMOBILE JACK THAT FITS SMALL SPACE

The size and shape of the ordinary automobile jack makes it very inconvenient to stow away in the average tool box. An ingenious Englishman has just perfected a jack which has none of the objectionable features as to size and shape, and possesses a



Newest Type of Jack for Automobilist Which Overcomes Many Difficulties

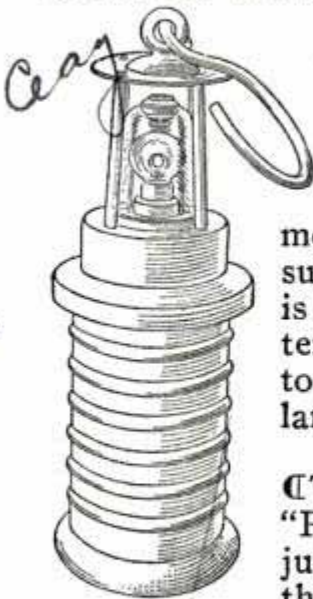
remarkable range of uses. It can be used on cars of all types, no matter how small the clearance, its range of action extending from the lowest to

**AEROPLANE-WING. COVERS
MADE OF STEEL** 12

Aeroplanes with steel wing covering are likely to become factors in the development of aviation, if the work of certain British investigators accomplishes the results they expect. A steel fabric for covering wings has recently been made which, it is believed, will add materially to the strength of aeroplanes and at the same time make them much safer. The wings will at least be safe from the splitting and tearing that now occasionally happens. The basis of the new fabric is a steel gauze of very fine mesh. This is treated with a preparation which makes the gauze a solid mass and is absolutely impervious to water and air. Wings of this fabric, of course, weigh more than those heretofore used, but not enough to make any material difference in machines weighing 1,200 to 1,500 lb., whereas the additional strength is so obviously advantageous, that the idea is well worthy of careful investigation.

**PRIZE-WINNING DESIGN FOR
SAFETY LAMP** 17

The electric safety lamp for the use of miners, shown in the accompanying illustration, won the \$3,000 prize in a competition recently held in England. It is the invention of a German. The lamp surmounts a compact and substantial base wherein is inclosed a storage battery of sufficient power to supply current to the lamp for many hours.



The oil-tank steamer "Petroleum," which has just been purchased by the British navy, has been equipped with a flexible-hose device that will make it possible to pump oil to a battleship on the open sea in any weather.

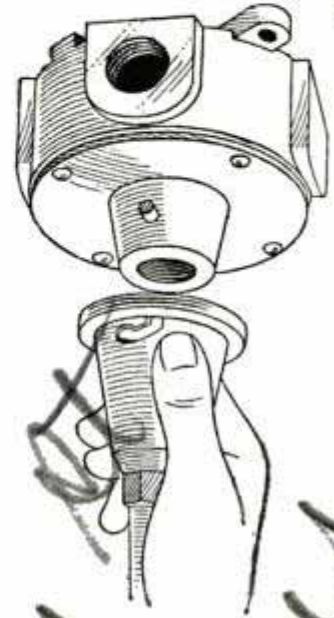
H. Haerber,

**VALVE-CLOSING ELECTRIC-
CONNECTION BOX** 250 N

An automatic, valve-closing, water-tight floor-plug box for electrical connections, designed to take the place of the old-style combination switch and receptacle, with a cap to screw over the opening left by the removal of the plug, is finding a ready market, both for floor connections and for marine installations. With the old type of connection there is always danger of the connection receptacle being left open, permitting the entrance of water into the box and conduit system, thereby rapidly destroying the interior fittings and wire, as the caps are seldom properly screwed back into place, whether because the threads of the box have been stripped or become clogged with paint, or because the operator did not take the time to put the cap back on.

With this device, the opening left by the breaking of the connection is automatically closed by a spring-operated valve, thus making it impossible to leave the box in other than a water-tight condition. Another feature of the device lies in the fact that no switch is required, as it is just as easy to turn the plug in and out of position as it is to turn a switch handle, the action of the valve and spring serving the double purpose of making or breaking the connection, and of making the box water-tight.

A new method of preserving oil paintings, recently patented in Germany, consists of inclosing the entire picture in a case having a glass front and filled with nitrogen.



8.00

43 Murray
New York

HOW TO PREDICT CHANGES IN THE SEASONS

A foreknowledge of the changes of season would mean a great deal to the average business man, but it is

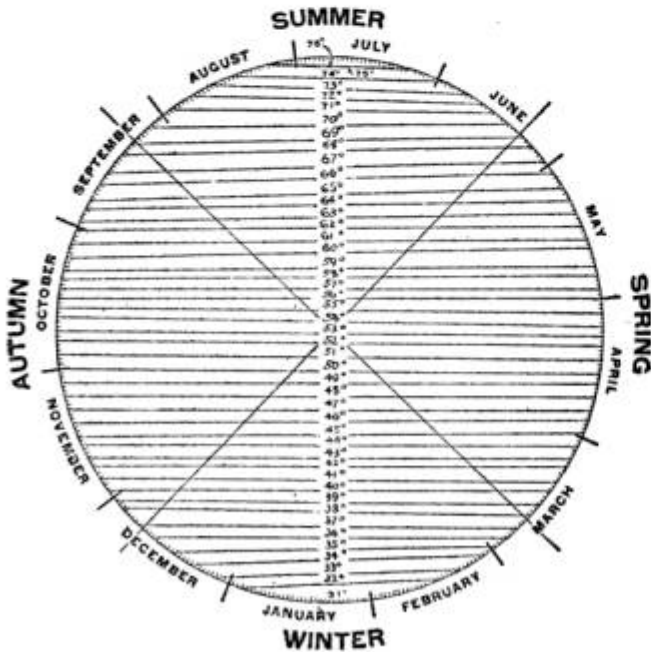


Chart Showing the Average Temperature of 30 Years for Various Dates of Each Month in Philadelphia

scarcely possible to predict, with any degree of accuracy, just when these changes will come. It is possible, however, to gain such knowledge in an approximate degree.

In a recent issue of the Heating and Ventilating Magazine, Wm. Campbell states that he has been able to get a fairly close prediction as to the time when seasons change and when to expect high or low temperatures, through a chart which he has prepared. The chart gives the average temperatures at different times in the year ranging through a period of 30 years, thus enabling a man whose business is affected by changes of seasons to foretell with some degree of sureness the various changes in temperature that may be expected, and arrange his business accordingly. The data from which the chart was constructed were furnished by the weather bureau. It must be understood that the temperatures recorded are the average for 30 years and, therefore, are not the temperatures of any particular year. The making of a similar chart for any city

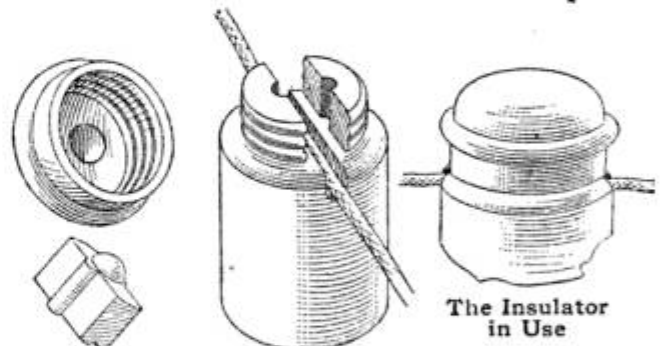
is merely a matter of paper, pencil and rule, after the figures as to the average temperatures have been obtained.

FLIGHT OF 630 MILES WITHOUT LANDING

The longest flight without landing was made in September, when the French airman Fourny piloted a Farman biplane for a distance of 1,010 kilometers, nearly 630 miles, in 13 hr. 18 min. at an average speed of 49.7 miles an hour. This is the first time an airman has flown over 600 miles without interruption, and it is interesting to recall, in this connection, that it is only six years since Santos-Dumont flew a little over 700 ft., and four years since the 100-kilometer mark (62.1 miles) was exceeded.

SIMPLE AND EFFECTIVE INSULATOR

A compact insulator which secures the wire firmly without the use of tools has been produced by a London manufacturer. As shown in the accompanying illustration it is comprised of three pieces. The wire is laid in the groove, the small section laid in the slot and the cap screwed down. The cap coming into contact with the rounded top of the slot section permits a degree of pressure which grips the wire firmly. In the manufacture of the insulator every gauge of wire is provided for. The insulator is so simple in



Three-Piece Insulator of Novel Type. Smallest Section is Placed in Slot and Cap Screwed Down

construction that it may be attached by men unskilled in the lineman's craft with the assurance that it will prove entirely effective.

"HOUNDS AND HARES" GAME ON MOTORCYCLES



Members of a motor club in England make good fun out of the game of "hounds and hares," playing it on motorcycles. The man and woman riding the side-car motorcycle shown in the illustration are the "hares." The woman carries a bag of torn paper, handfuls of which she throws out at intervals to give the

The "Hares" Throwing Out Torn Paper in a Motorcycle Adaptation of the Game of "Hounds and Hares"

taken, the "hares" had a start of 10 minutes and were not caught.

"hounds," likewise riding motorcycles, the line of the run. The day on which the illustration was

GROWING FLOWERS THAT WILL KEEP FRESH

Growing flowers and fruits in such a way as to lengthen the time in which they will keep fresh after being picked, is one of the new interests of scientific agriculture, and already carnations have been grown which will last one-fifth longer, or even more, than carnations ordinarily grown. "It is not improbable that the next generation will see the production of a peach which will last a year, without the use of cold-storage methods which injure the flavor," is the statement of an agricultural chemist on the new study.

The New Hampshire Agricultural Experiment Station has just made a study of the keeping qualities of carnations. If the carnation plants are grown by the use of a bone-meal fertilizer, not only is the number of

carnations increased, but the flowers are found to last one-fifth longer after they are picked.

Potassium chloride also increases the keeping qualities of these flowers, but seems to be of no use as a fertilizer. Hen manure, on the other hand, though a good fertilizer applied in very small quantities, greatly injures the keeping qualities of the flowers, when too much is used.

At an average selling price of four cents each for carnations, very nearly \$5,000,000 worth of these flowers are sold in the United States and Canada in one year, for more than 120,000,000 carnations are grown annually. Thus, if carnations are valuable according to the time which they last, this increase in keeping qualities alone, without tak-

ing into account the production of a greater number of flowers, means an increase of one million dollars per year in the carnation crop.

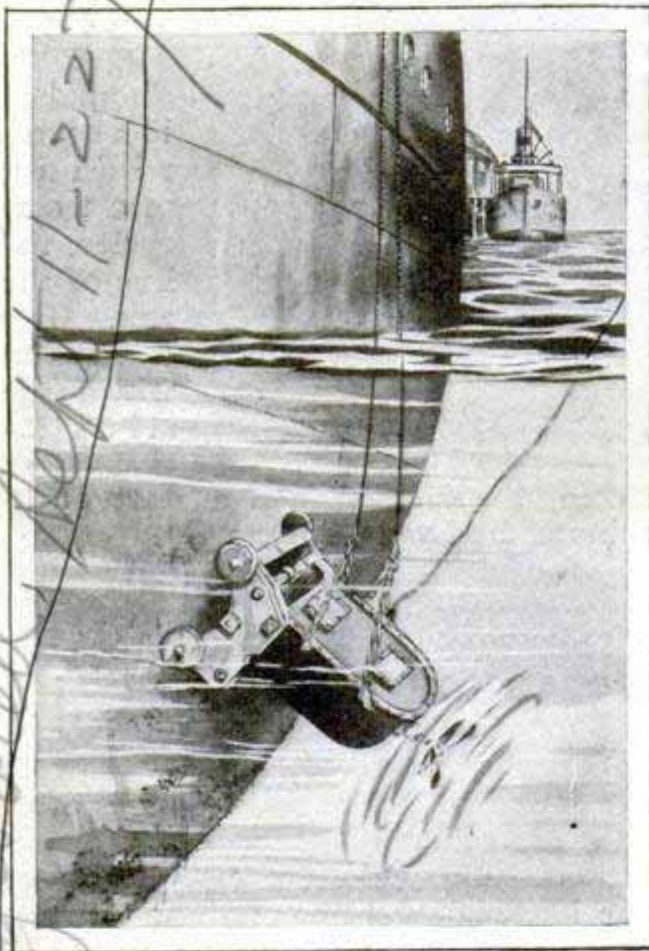
Such experiments as these show that future researches may enable us to ob-

tain fruits and flowers which will have far greater keeping qualities than those which are grown under present methods. These improvements will come by the use of proper fertilizers, and by selection.

MANICURING AN OCEAN LINER AT HER DOCK

If the development of apparatus for the improvement of shipping continues, it may not be necessary for vessels to

work brushing off the ship's bottom all the time. The machine is provided with a small propeller which turns while the brushes are under water and in this way forces the machine against the ship at all times.



Machine That Brushes Marine Growths from Ships' Bottoms without Necessitating Docking

undergo the expensive operation of docking so frequently to keep their bottoms free from marine growths. An inventor has recently perfected a device for cleaning off a ship's bottom while the vessel is moored to a dock or a buoy discharging cargo. This device consists of a series of brushes operated by a submersible electric motor. While in a harbor, in the waters of which marine growths abound, this device may be kept at

USING EGGS AS GERM DESTROYERS

Are eggs antiseptic? Can they kill the ubiquitous microbe? If so, why do they spoil so soon? Some experiments of Drs. L. F. Rettger and Joel A. Sperry in the Sheffield laboratory, at Yale, seem to prove that the white as well as the yolk of eggs has some power to kill bacteria of various kinds, including some that produce serious diseases, such as typhoid fever and other intestinal troubles.

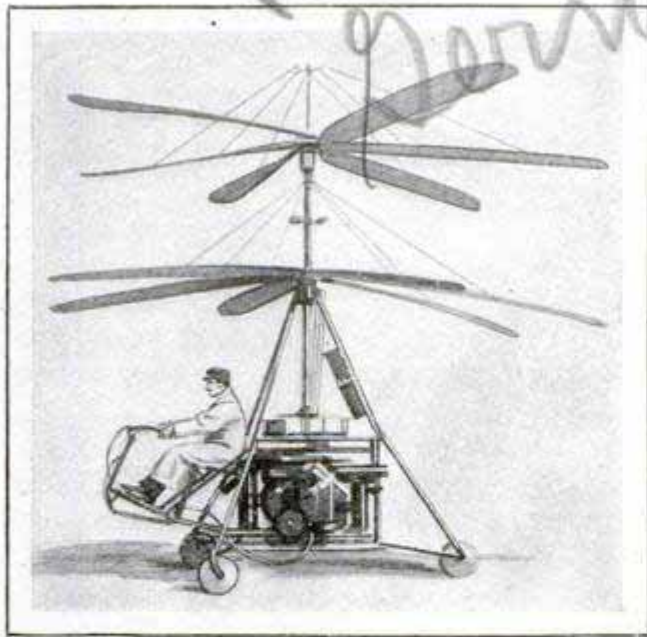
It is known that bacteria will soon penetrate the shell of the egg, especially if it has been cracked or washed, which latter seems to remove a protective coating which the egg possesses when laid. In order to confirm or disprove the findings of the Russian scientist, who first announced that eggs had antiseptic properties, they opened fresh eggs under sterile conditions as follows: The eggs were soaked in alcohol and then one end was passed through a flame; the end opened with sterile scissors; the contents, removed by means of a sterile tube, put into sterile test tubes, inoculated with pure cultures of various bacteria, and then placed in an incubator at body heat. They then examined the cultures at various intervals. In all instances except one, the number of germs progressively decreased, and in some instances the tubes became sterile almost immediately. This explains why the white of egg makes a good protective dressing for wounds, burns, etc.

386 INCANDESCENT MANTLES FOR
AUTOMOBILE HEADLIGHTS

A new automobile headlight, which uses alcohol as fuel and is of the incandescent-mantle type, has made its appearance on the market. The alcohol is carried in a small vessel under the lamp and is forced to the burner by air pressure, the air having been pumped into the container by means of a hand pump. The alcohol is vaporized and burned in a small, thick incandescent mantle claimed by the maker to be shock-proof. One filling of the alcohol container is said to be sufficient to keep the light burning for 20 hours.

GERMAN WINGLESS
AEROPLANE

One of the most ancient aeroplane-construction ideas—that embodying the lifting of a heavier-than-air body into the air by means of propellers whose blades revolve horizontally—is being experimented with by a Dresden engineer. The flying machine of this inventor has no wings or planes, the supporting means being the blades

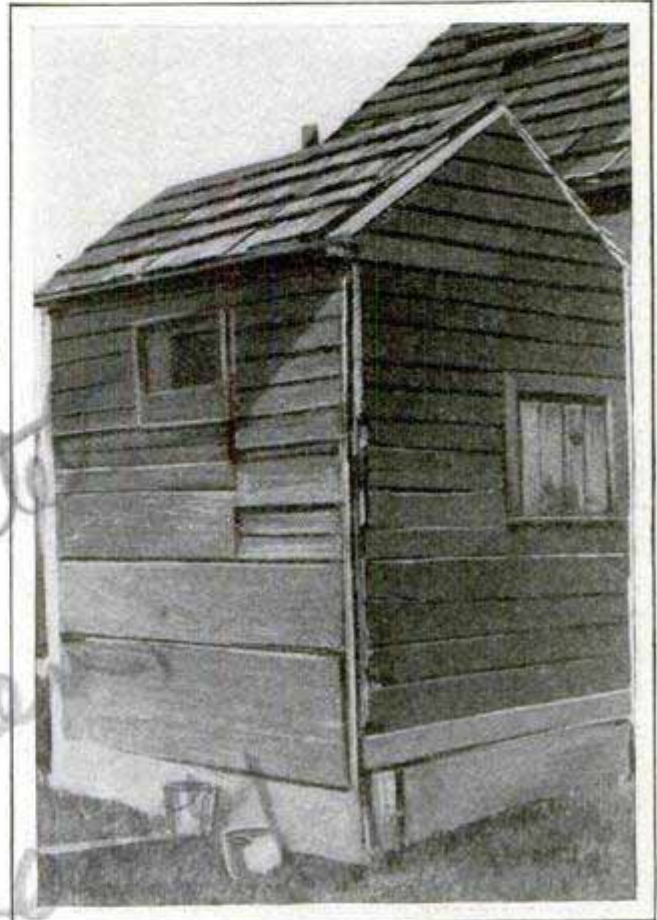


A Wingless Aeroplane Designed to be Lifted and Supported in the Air by the Blades of Its Two Propellers

of two six-bladed propellers, mounted one above the other on a shaft rising vertically above the motor.

OLDEST RAILROAD TICKET
OFFICE STILL STANDS

The residents of Newcastle, Del., claim to have an interesting relic of early railroad days in the shape of the



Remains of Railroad Ticket Office Built at Newcastle, Del., in 1832, Said to be the Oldest in the World

first railroad ticket office ever erected in the United States. This office was built for the Newcastle and Frenchtown railroad in 1832 and is still standing, although it has long since gone out of business as a ticket office. The character of the structure has not been changed during the entire 80 years of its existence, however, and though the window where tickets were sold is now covered with boards, its shape can be seen.

Since the establishment of the Chinese Republic the telephone is rapidly being introduced. Thus, in Peking, the government has built an exchange which already has 6,400 subscribers, 3,000 of whom are native residents of the Chinese and Tartar sections of the city.

668. cmo. Otto Baumgarten

HOW THE SPIDER USES STRUCTURAL

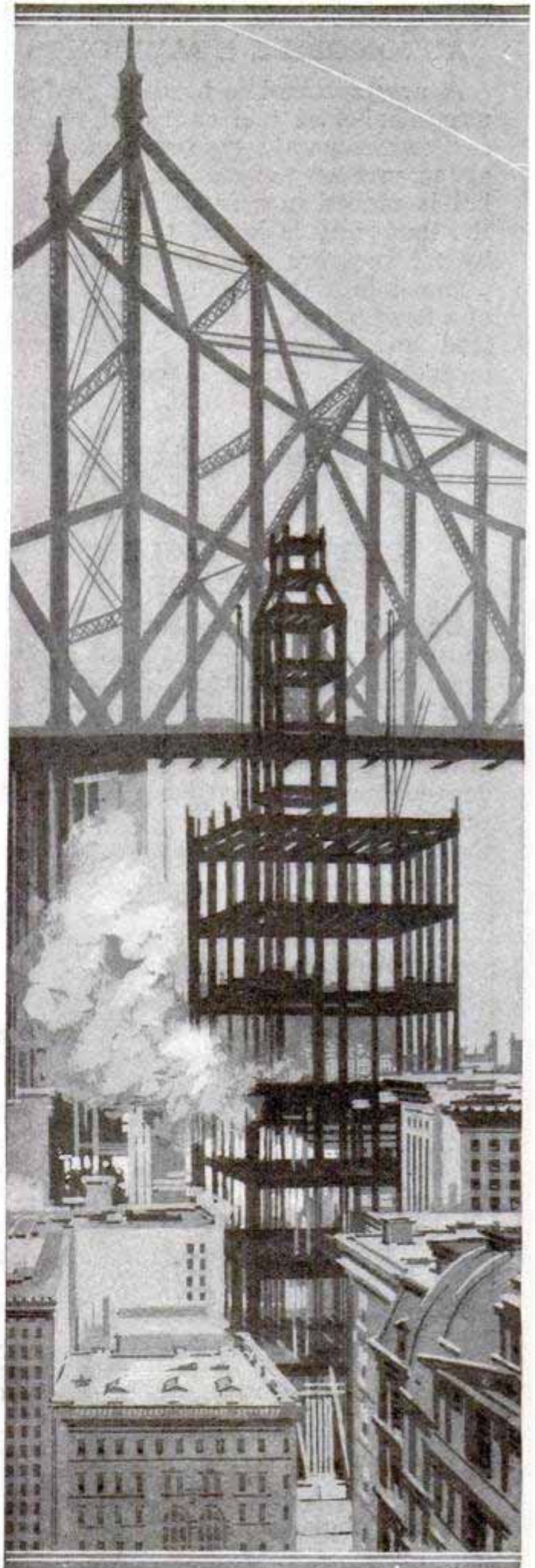
By J. E. MURPHY

*Associate Member American Society
of Civil Engineers*

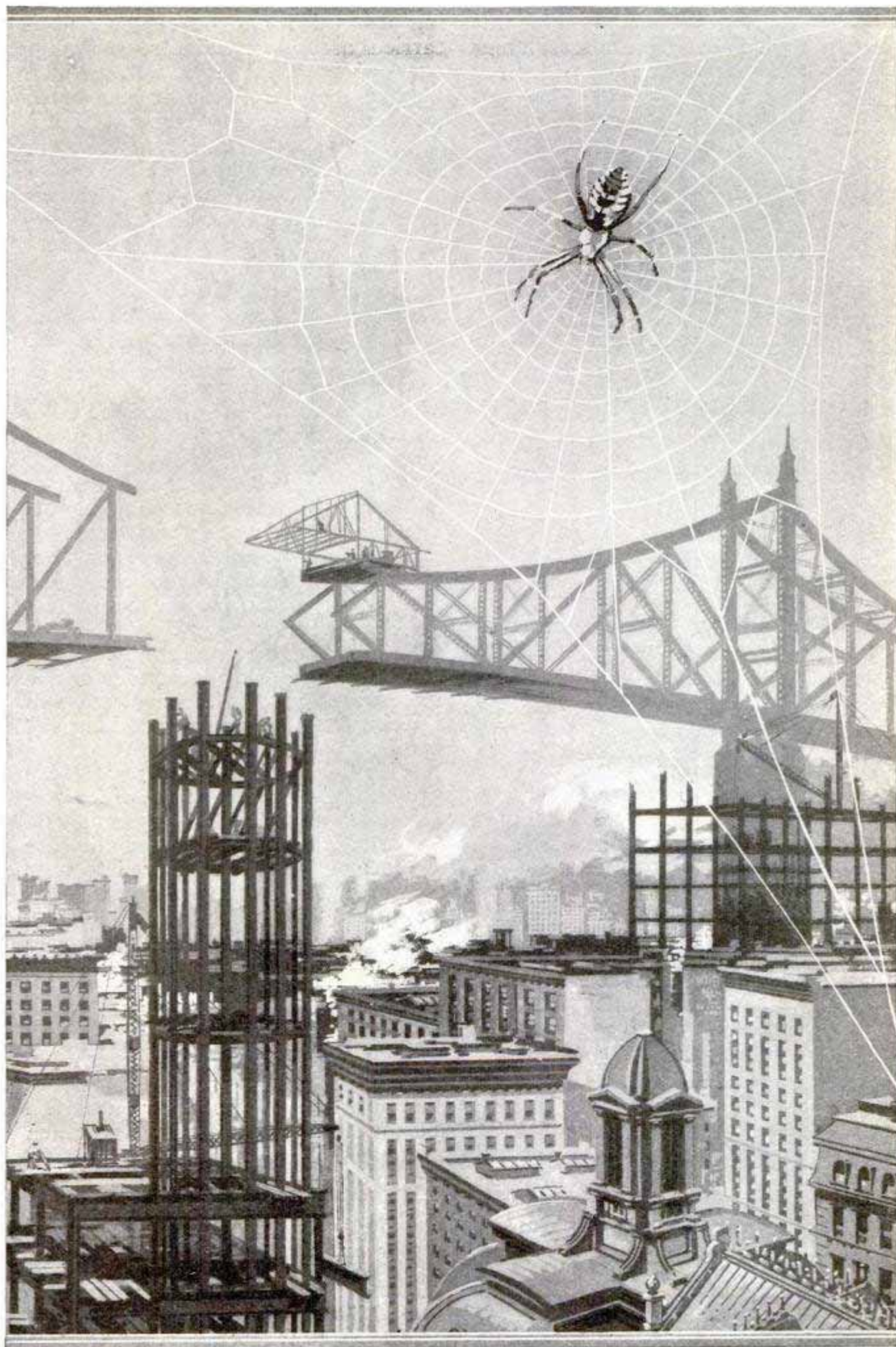
An elaborate network of steel cables, 336 ft. in height, erected in place by one man without the assistance of hoisting engine, block and tackle, or other mechanical accessories, would be a marvel in the construction field, and would be written up in the greatest detail in the technical papers. Yet the equivalent of this process is going on unnoticed in the angles of our back porches and in the trees and shrubbery, every day during the autumn.

There is no more industrious or ingenious builder in the world than the spider, whose web furnishes an example of the highest skill, from an engineering point of view, of the same type of engineering that is displayed in skyscrapers and bridges. To appreciate what this common object, the spider web, means to its builder, one must take the builder's point of view. The webs illustrated in this article are all vertical webs of the orb weaver, the common variety of spider of the temperate zone of North America. The orb weavers, observed in gathering the data, averaged slightly less than $\frac{3}{4}$ in. from front to back claws, and had therefore about 1-112 the reach of the average man. In considering these structures as they appear to the builders, it is necessary to apply a unit of measure proportioned to the size of the builders—that is, a foot measure equal to 1-112 of the standard foot. On this basis, the web A is 280 ft. in height; the web B, 336 ft., and the web C, 120 ft.

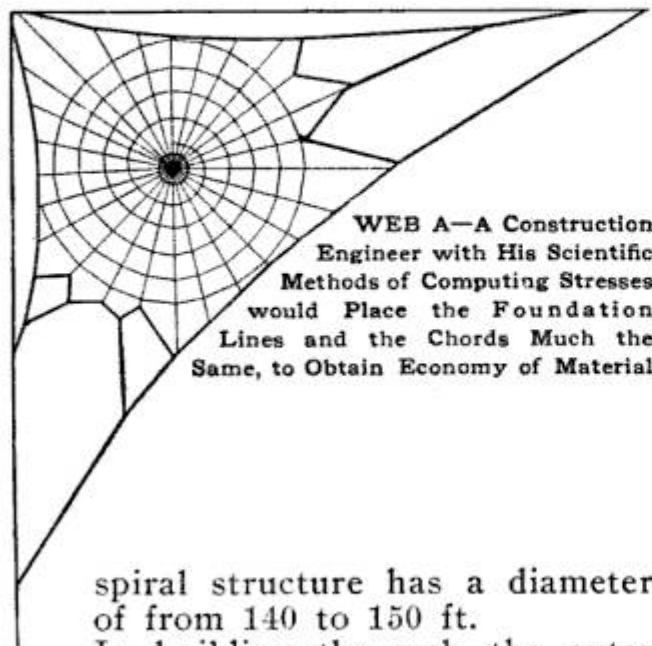
While there are minor differences in the construction of webs, due to local conditions or the preferences of the individual builder, the general form is the same in all. At the center of the snare is a space filled with material that to us is a fluffy mass of fine lines, but to the builder a network of large rope, with an outside diameter of about 10 ft. Outside of this is a comparatively open space in which only the radial lines of the snare are found.



PRINCIPLES LIKE A SKILLED ENGINEER



Beyond the open space is a spiral structure which serves as a scaffolding for the true snare. To the builder the



WEB A—A Construction Engineer with His Scientific Methods of Computing Stresses would Place the Foundation Lines and the Chords Much the Same, to Obtain Economy of Material

spiral structure has a diameter of from 140 to 150 ft.

In building the web, the outer or foundation lines are first erected. Usually a number of guy lines are required for holding the foundation lines to the right position. Sometimes these guy lines are incorporated into the snare as radial lines, but more often they are cut away at a later stage of construction. With the foundation lines all in place, the center of the snare, from which lines radiate in all directions, is first established. A vertical line is dropped from the top of the structure to the center, and continued downward to a connection with the lower foundation line. Lines are then thrown out from the center to the right and left alternately. Care is observed to keep the structure well balanced during construction. There is no uniform angular spacing between the radial lines, nor is any exact order observed in placing these lines. But at every stage of the process a balance in stresses is maintained, and, in contrast with the situation met with in the erection of some steel structures, there is never a time when there is danger of collapse from eccentric loading or the overloading of a weak member. With the completion of the radial lines the structure is ready for the spiral scaffolding. In placing this, a line is started on the vertical extend-

ing upward from the center and is carried around repeatedly, spreading outward in spiral form to the outer limit of the snare, this line being permanently attached to each radial line as it is crossed. This completes the real structure of the snare. The spaces between the spiral lines are afterward filled with the fine, beaded, viscid lines that serve to entangle and hold the hapless prey.

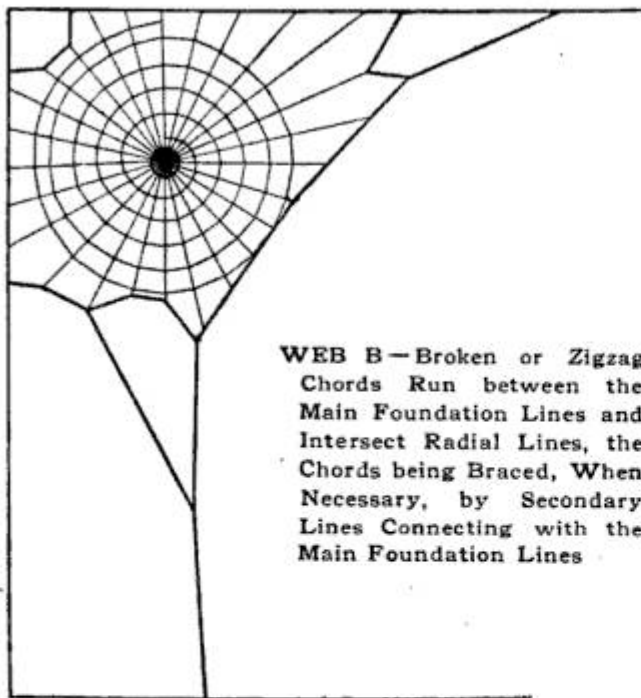
The spider is able to build this complex structure single-handed and without the aid of mechanical accessories because of just two natural faculties. One is his ability to drop vertically with a line as he spins it, and the other is his skill in climbing in any direction, spinning a line as he goes and holding it out with one claw so that it will not foul with the line he is climbing on. The fresh-spun line is very elastic. It is often stretched to three or four times its natural length and then snapped into place after the builder has climbed around some corner in his structure. In this process he shows himself to be an excellent judge of distance, knowing just when to quit spinning and to begin stretching the line.

While the snare is a remarkable structure, it is in the system of foundation lines that broad judgment and something akin to technical ability are to be found. It may be well to note the somewhat disappointing fact that the most perfect webs are built by young spiders. The old-timer, who has been through the process many times, and who has lost, perhaps, the enthusiasm of youth, is likely to become careless in placing his lines, and will often trust to luck that a weak line will hold. The young spider, on the contrary, will place his lines with the greatest care and will strengthen any that seem in doubt.

Foundation lines, unlike the single-strand radial and spiral lines, are built to stand permanently, consisting of five or six strands each. All parts of the structure are in tension, and the system of bracing consists, therefore, of diagonal tension members so placed

as to supply the necessary reaction against unbalanced loads.

A remarkable feature in foundation systems is the skill shown in the economical use of material. Material, for the spider, is a matter of labor in placing; but as each foundation line consists of five or six strands, the necessity for economy is apparent. Two methods are used in accomplishing this end. The most common method is the concentration of the stresses from a number of radial lines into a main foundation line through a system of two or more secondary foundation lines. The other method, which is, perhaps, the most interesting, consists of a broken or zigzag chord running between main foundation lines and intersecting three or more radial lines. This chord is braced where necessary by secondary lines connecting with the main foundation lines. Excellent examples of this method of treatment are to be seen in the webs A and B. A competent engineer, with his scientific methods of computing the direction and intensity

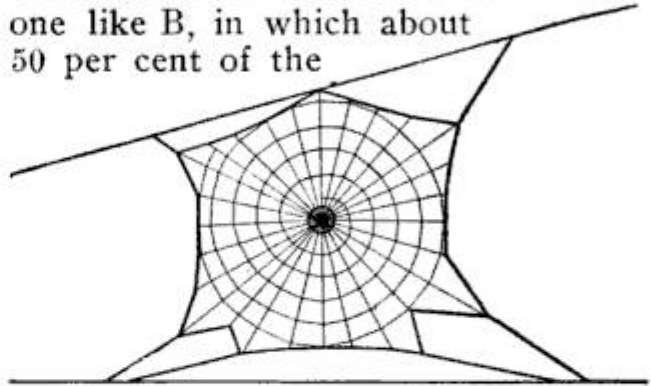


WEB B—Broken or Zigzag Chords Run between the Main Foundation Lines and Intersect Radial Lines, the Chords being Braced, When Necessary, by Secondary Lines Connecting with the Main Foundation Lines

of stress, would place these lines very nearly as shown.

This arrangement of foundation lines adds also to the elasticity, and, therefore, the life, of the structure. Such a web as A, with the radial lines

carried on strong foundation lines, will have, under all conditions, a more even distribution of stresses than one like B, in which about 50 per cent of the



WEB C—An Adjustment of Theory to Practical Conditions. If the Upper Foundation Line had been Allowed to Sag, It would Not have Permitted Room for the Whole Web Below, So the Middle of the Foundation Line was Attached to the Upper Beam, as an Engineer would Do

radial lines have a rigid support. Since an individual spider will follow consistently one or the other method, we find, in this humble field, what are virtually two schools of construction.

The web C is remarkable for its adjustment of theory to practical conditions. The builder was evidently a believer in elastic supports. But owing to the limited space available, it was impossible to suspend the snare from a single foundation line (which would have had a considerable curve downward) and keep the snare clear of the lower beam. In attaching the middle of this foundation line to the beam, the builder did what most engineers would have done under these conditions. It is to be noted that there is nothing haphazard in this construction. The space available was evidently estimated in advance, and a method that would best meet the conditions was adopted.

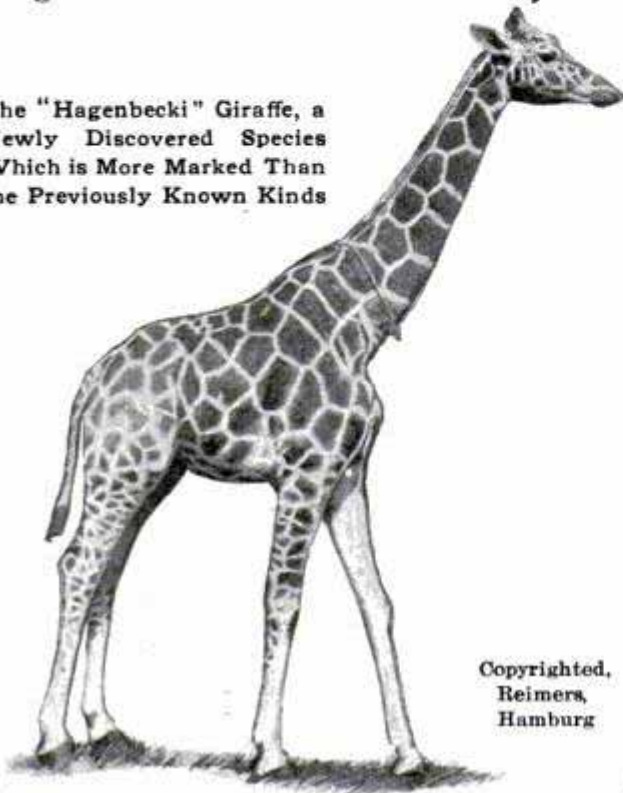
Snares are subject to many vicissitudes, often being damaged by heavy rains or wrecked by birds or larger insects. But a strong set of foundation lines is comparatively permanent, unless wrecked by some force, equivalent, considering its scale of strength, to an earthquake or a destructive hurricane.

A good foundation system is therefore regarded by the builder as a "good property," and, as conditions require, is built upon repeatedly.

GIRAFFE MARKED LIKE PICTURE PUZZLE

There recently arrived in Hamburg from Abyssinia an entirely new species of giraffe. As it was secured by Mr.

The "Hagenbecki" Giraffe, a Newly Discovered Species Which is More Marked Than the Previously Known Kinds



Carl Hagenbeck's travelers, the new species has been given the name of "Hagenbecki." Hitherto only two species of these long-necked African animals have been recognized, the northern or Nubian giraffe and the southern or Cape giraffe. The former is marked with fine light lines on a chocolate-colored ground and possesses three "horns" or stumps upon its head. The southern giraffe is covered with brown blotches on a buff ground and has two horns. The giraffe "Hagenbecki" is much more definitely marked than these two, the patterns being bolder and much larger. The lines, though light, are very distinct and the ground very dark. The specimen is quite young and, when full-grown, is expected to reach a height of 18 or 19 ft.

¶The teaching section of a French association for the advancement of sciences has recommended slanting in preference to vertical handwriting in the schools of that country.

SHIPPING GOLD ACROSS THE ATLANTIC

It would be natural to suppose that shipments of gold bullion back and forth across the Atlantic on the big liners would be attended by considerable precaution, requiring the vigilance of many men, but this is not the case. There is probably no other place in the world where the transport of great wealth is carried on with such simplicity.

As a case in point, one of the great liners has two strong rooms, the smaller being in close proximity to the captain's quarters, while the other is next to the provision department. The small strong room has its walls, floor and ceiling lined with 2-in. steel plate, and contains nothing in the way of furnishing other than shelves. This has more than once contained enough gold to buy the liner many times over. The locks, which are of the double variety, are rendered still more secure by covering the keyholes with steel hasps, which are themselves locked in place with massive padlocks. This strong room, being located in the most frequented portion of the ship, is being passed by persons at all hours of the day and night, which, after all, is the great protection.

The strong room located near the provision department is 12 ft. long by 4 ft. wide, and it often happens that both these rooms are filled to capacity with gold bullion. On one occasion the two rooms contained \$50,000,000 in gold bullion, packed in small kegs bound with steel hoops.

MACHINE ISSUES STREET- CAR TRANSFERS

A machine which, by the operation of a lever, prints and issues a transfer has been constructed for street cars. The transfer thus issued direct to the passenger contains all the information necessary, such as time, direction, date, and the like. The machine also makes a record of all transfers issued.

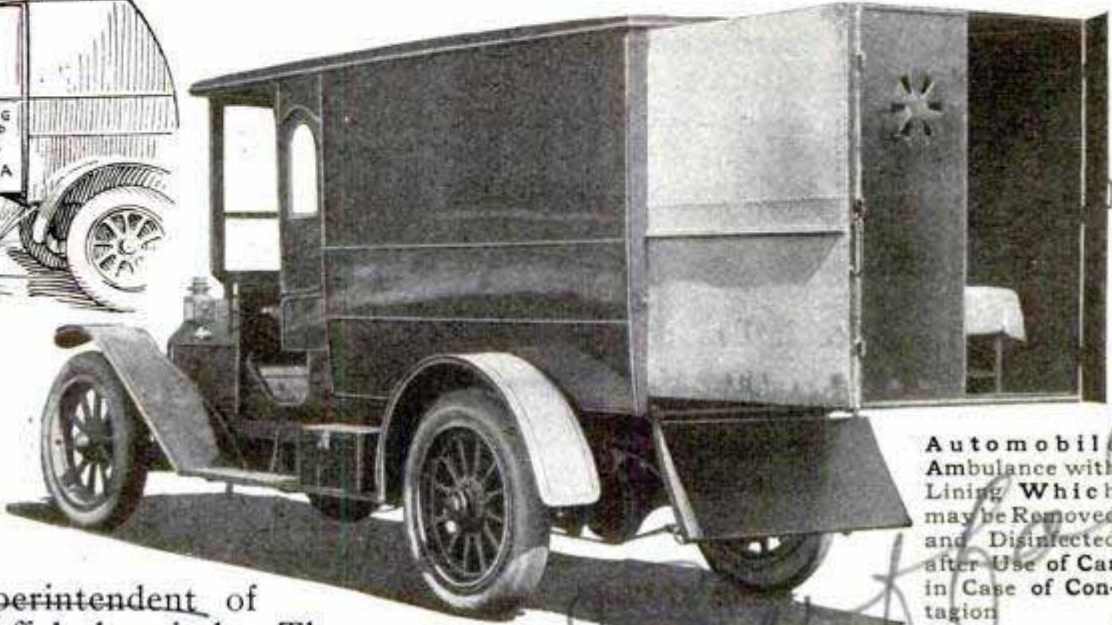
Champion Recording Co.
Pittsburgh, Pa.

647
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REMOVABLE LININGS FOR HOSPITAL AMBULANCES

A novel ambulance for the transportation of persons suffering from contagious diseases has recently been put into service in Buffalo with

an ambulance for each kind of disease, and yet that is what physicians say should be done. In lieu of this, Doctor Goodale has caused to be constructed a set of five of these steel linings, each



Automobile Ambulance with Lining Which may be Removed and Disinfected after Use of Car in Case of Contagion

highly successful results. It is the invention of Dr. Walter S.

Goodale, superintendent of one of the Buffalo hospitals. The innovation lies in the removable lining which can be taken out and thoroughly disinfected after each trip. The lining is made of channel steel and aluminum and weighs about 300 lb. Its interior dimensions are 6 ft. 8 in. by 5 ft. 3 in. and the construction is such that it exactly fits inside the wooden body of an ambulance.

In such institutions as that under Dr. Goodale's care, patients are received suffering from a variety of contagious diseases. It is manifestly impossible for any hospital to maintain

being used for a specific disease. An infected lining can be removed and replaced with a clean one in about five minutes.

The extra linings are stored in five air-tight metal compartments built on a semicircular platform placed on the edge of the garage turntable. The linings are mounted on wheels and when a lining is needed two men wheel it into the ambulance, which then calls for the patient. Upon returning from the call, the lining is taken out, fumigated and restored to its compartment.

OUR CANAL BUILDERS TO ENGLISH EYES

It is the American builders of the Panama Canal, the men on the job, that seem to most impress English tourists and investigators of the works, and this view is strikingly presented by an English journalist, John Foster Fraser, who is now writing for the London Daily Mail a record of his thoughts and studies on the ground. Following are some extracts from his articles:

"'Yes,' observed the American en-

thusiast, 'it is a great ditch. You see those flat cars piled with dirt? Well, by the time the Atlantic joins the Pacific we shall have removed as much dirt as would fill such a train of cars 96,000 miles long, which is getting pretty near four times round the earth. Yes, it is a great ditch!'

"This is the spirit of the 35,000 men who, between Colon and Panama, are digging and blasting, damming rivers,

of above hospital

Buffalo, N.Y. 1908
Wm. S. Goodale
Superintendent of Buffalo Hospital

fighting landslips, and building locks so that the great canal shall be finished long before the official opening day, which is in 1915.

"It is a big thing. The world is looking on. It is an enterprise which fits the American temperament. It is a dramatic as well as a colossal undertaking. Others have tried to build canals across the Isthmus. The French came to failure. The Americans are going to succeed. Everybody is working at top speed, and the end is within sight."

"Then you reach the Culebra Cut, the thing of which the Americans are proudest because it has caused them most trouble. This cut is nine miles long, hills on each side, and the cubic yards of earth and rock cut away run into dozens of meaningless millions."

"For several days I have been jogging up and down the drunken construction line, now along the bed of the finished way—outside the locked region it is 40 ft. below sea level—now scrambling over 'slides,' then wandering through the large white casements of concrete locks.

"The noise is tremendous. Bells clang and engines shriek and cars piled with excavated earth are rumbling off to aid in the construction of a dam or a great 'spit' on the Pacific side. All the rock and soil are volcanic and gray and red and irregular. Boom, boom, go the dynamite explosions and a chunk of a hillside is disintegrated. A monster of an engine shovel, almost uncanny in its movements, comes reeling forward over the uneven way. It

bends its head and sticks its snout into the debris. There is a clatter, it jerks back its head, and in its maw is four tons of broken rock. It heaves on one side, and from a door, under its chin as it were, it dumps its load on one of the long cars. Then it plunges for another mouthful.

"The cars are ugly and battered. They have a fence only on the side away from the shovel. Between each car and the next is a steel plate, so that it is just like a long ribbon of a car. When the shovel has deposited its mouthful, a bronzed and sweating American, with his blue shirt open at the throat, gives the waggle of a yellow flag, and the engine driver hauls along a few yards so the next mouthful may have room. Thus it goes on with clang and clamor until the train is loaded.

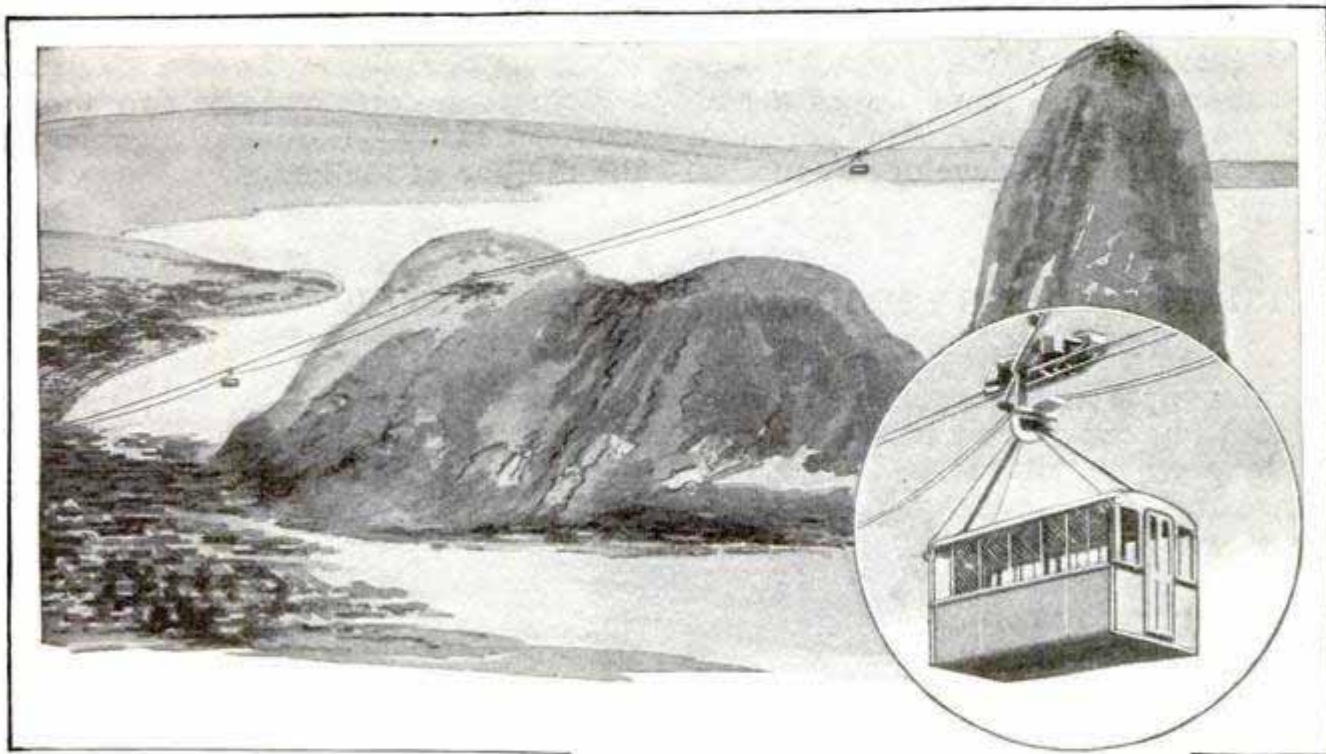
"Away it rolls. The 'dirt' is wanted for a dam in a declivity between the hills."

"There is the lithe, chewing American, clear-skinned, clear-eyed, really feeling joy in what he is helping to accomplish. There are the sluggish Spaniards, more sluggish mixture of Spaniard and native, but kept at it under the stimulating tongue of the gang boss. There are the niggers, easy-going, and a considerable number of them from the British West Indies; there are Italians and Scandinavians; there are Chinese; there are even slim-limbed, gentle-featured East Indians, with heads voluminously swathed in dirty turbans. The labor of the world has been placed under contribution to build the Panama Canal."

TWO-SPAN AERIAL RAILWAY IN RIO DE JANEIRO

From the top of Sugar Loaf Hill, the famous conical mountain that rises to a height of 1,260 ft. from the promontory Morro da Urca to the west of Rio de Janeiro Bay, a magnificent view is presented of this most beautiful natural harbor, but its ascent is very difficult and dangerous, so that the great ma-

jority of tourists must necessarily miss the sight. For this reason the aerial tramway shown in the illustration was recently installed. It has two spans, the first from the beach of the bay to a bluff near the mainland and the other from this point to the top of the Sugar Loaf, being, respectively, 1,886 and



Aerial Tramway Connecting Rio de Janeiro with Top of Sugar Loaf Hill

2,624 ft. long and independently operated. The car accommodates 16 passengers and the conductor.

Particular attention has been paid to

the safety of the passengers, the car in this case running along two cables, each of which is strong enough to carry the loaded car alone.

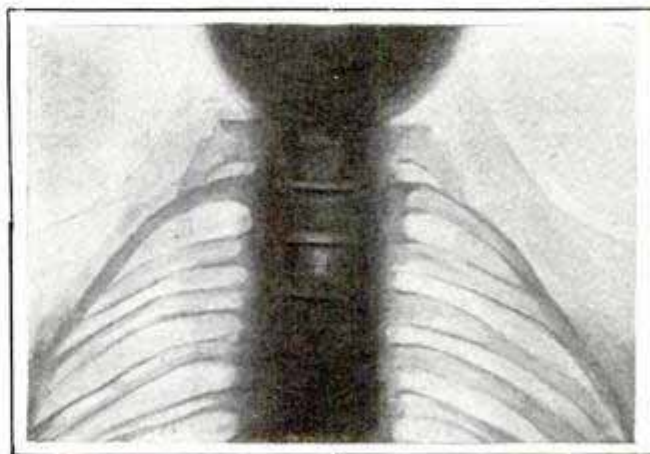
ARTIFICIAL COW'S MILK MADE FROM BEANS

705 An artificial milk, which is said to contain all the elements of the best cow's milk and be usable for the same purposes, is being manufactured from soya beans, according to an article in the Journal of the American Medical Association. It is also stated that this artificial product is more digestible than ordinary milk and its cream more nourishing. It can be used for all cooking purposes and good cheese can be made from it, but it will not produce butter. Being germ-free, it will keep longer than cow's milk.

The process of making this soya-bean milk was discovered by three Germans, who have spent three years perfecting the apparatus. The manufacture is said to be simple, and the product is always uniform. It can be sold at good profit for six cents a quart, which is cheaper than milk in many localities.

A MAN WITHOUT COLLAR BONES

561 One of the rarest congenital defects of the human body is the total absence of both collar bones, there being, it is believed, only two previously recorded, although 22 cases have been noted in which the defect is incomplete. To the record of the two complete defects, however, must be



An X-Ray Photograph Showing the Complete Absence of Both Collar Bones in an Otherwise Normal Man

Journal A.M.A.
1912

Nov. 2 1912

added another, that of a patient of Dr. Max Eichmann, of Chicago. This case is a merchant, 32 years old, of a normally developed family. He is of small size, but has well-developed muscles,

but neither collar bone exists. In the place of these bones, however, can be felt a strong cord, and the two shoulders can easily be brought together in the midline of the body.

FIR-TREE ODOR DISGUSTS BOLL WEEVILS

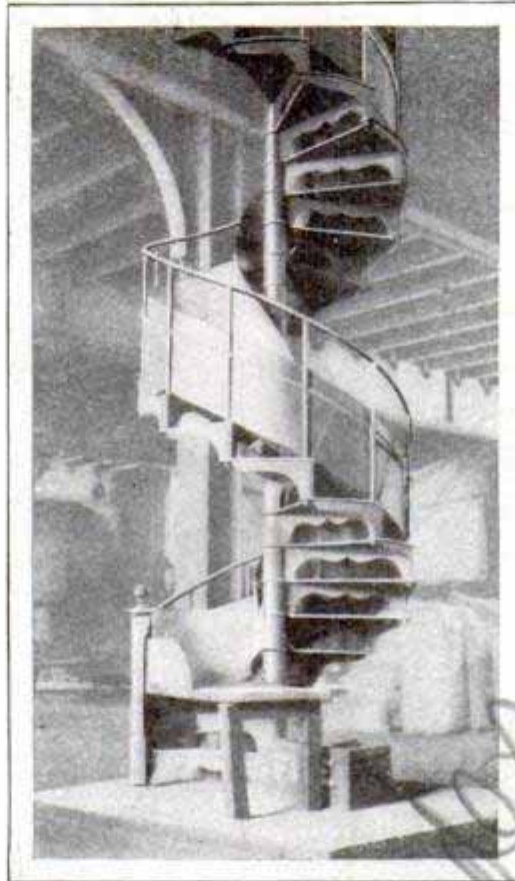
The simple and inexpensive remedy of planting cedar or fir trees about the fields in which cotton is grown is the latest treatment the Department of Agriculture is experimenting with in its efforts to stamp out the boll weevil. This little insect damaged the cotton crop of the South to the extent of \$150,000,000 last year, it is estimated. A series of experiments has been conducted by Dr. Joseph Thompson, of Hyattsville, Md., and the cedar-fir remedy has shown possibilities.

There is something about the odor, or pollen, or some other emanation, from trees of these species that is so repugnant to the insect that it is not comfortable in the vicinity and the influence of the tree is far-reaching. The idea first was suggested by observation that where the fir and cedar flourished, the boll weevil was wholly absent, but that where growths of these trees were cut out, the pest came in great numbers.

Several hives of a shipment of bees on the Great Northern Railway were smashed in transit, the bees took possession of things, and a near-panic was caused among the railroad hands for a short time.

SPIRAL STAIRS CONVERTED INTO FREIGHT CHUTES

A freight chute of novel construction, used on the Southern Pacific piers at New York for the



Spiral Staircase of New York Warehouse Adapted for Use as Freight Chute

delivery of small freight from the warehouse lofts to the main floor of the piers, is shown in the accompanying illustration. These chutes are simply the spiral iron staircases between the floors adapted for their new use by fitting them with a galvanized iron trough in which small freight safely descends from floor to floor. They have been found much more satisfactory than the straight wooden chutes formerly used, in which latter small bags of rice, beans, dried fruits, meal, or the like, and freight shipped in boxes and cases of light construction were often damaged by reason of the too great rapidity of the descent.

construction were often damaged by reason of the too great rapidity of the descent.

MACHINE TO MAKE A RUG A MINUTE

An invention creating considerable interest among textile men is a rug-making machine that will make clipped hearth rugs, 30 in. wide by 6 ft. in length, at the extraordinary rate of 60 an hour. When it is considered that no less than 2,520 cloth clips are needed for each rug, and that these are picked

Wood Street, Boston, Malta, Eng.

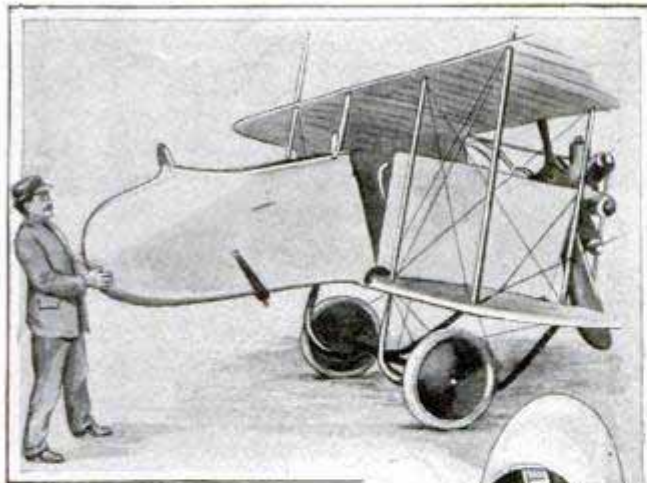
up automatically by the machine, placed in the canvas, and the rug completed all within the space of one minute, the capability of the machine must indeed be great.

The only manual labor connected with the rug making is said to be the cutting of the cloth clips. An idea of the saving both in time and cost may be gained from the fact that at present it takes one rug maker four hours to produce one rug, and the cost is \$36.50 per hundred. It is said the new machine will produce them at a cost of \$6.09 per hundred.

The most interesting feature of the machine is the spring clips, which automatically pick up the cloth strips from the flexible platform and convey them to the machine.

FARMAN BIPLANE HAS DETACHABLE CABIN

The latest type of Farman biplane has a shell-like cabin for pilot and passenger which can be put on or taken off as desired. It provides the operator of a biplane with a riding space as comfortable and well protected as such accommodation is, customarily, on a



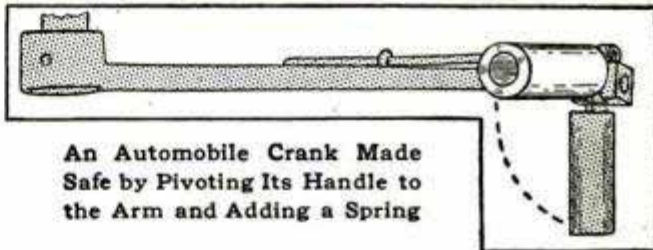
The Comfortable and Well Protected Detachable Cabin of the New Farman Biplane



monoplane. The rounded end of the cabin is, of course, the front end. The detachable feature adds considerably to the convenience of transport.

NEW "SAFETY" CRANK FOR AUTOMOBILES

A new type of safety automobile crank, the handle of which automatic-



An Automobile Crank Made Safe by Pivoting Its Handle to the Arm and Adding a Spring

ally and instantly folds out of the way in case of a back fire, is now being marketed. The safety feature is accomplished by pivoting the handle and attaching the spring. In the lower illustration the handle not dotted is in its normal position, where it is in the same plane as the crank arm itself, and this is the position it takes should a back fire occur. When the engine is to be cranked, all that is necessary is to pull the handle around, and when released it is sprung back again.

2106 Superior
V. Maduel
Cleveland, O.
\$ 5.00 Pat pending

—
Motion pictures are doing much to acquaint foreign peoples with the United States, the number of films exported from this country being extraordinary as compared with the films we receive from other countries. Some 15,000 miles of films were exported in the last fiscal year, valued at \$6,800,000, and only 3,000 miles were imported.

AERIALY PROPELLED BICYCLE-SLEDGE

A novel assembling of parts of different types of craft to give birth to a still different type of craft is shown in



An Odd Sledge Which will Run on Bare Ground or on Ice

the accompanying illustration, the result being an aerially propelled sledge that will, it is claimed, run on bare ground or on ice at a fair rate of speed. Attached to the under sides of the run-

ners are little wheels of the caster type. Mounted on the rear sled is a bicycle frame, which carries, forward of the handlebars, an aerial propeller, which is driven by the pedals of the bicycle.

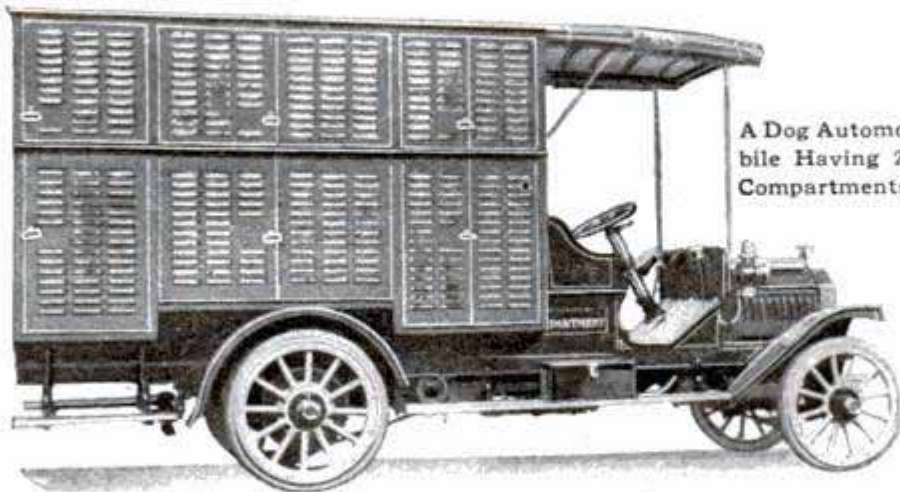
DIESEL TYPE OF ENGINE FOR FARM TRACTORS

After several years of quiet development, a concern in England has brought out an agricultural tractor equipped with a Diesel-type internal-combustion engine, which has shown surprising efficiency under test. This engine is said to be the first operating on the Diesel principle to be applied to a road vehicle, and will, according to the Motor World, thrive on thick, stumpy oil as black as a hat and nearly as repugnant as the slime that collects at the bottom of stagnant pools. The fuel it will use successfully is virtually the residue after practically all of the good has been extracted from crude petroleum. This means that it will run on the cheapest kind of fuel, and, even of that, its wants are extremely moderate, a little more than half a pint per horsepower being its requirement.

534 **DETROIT'S DOG-CATCHING AUTOMOBILE**

A dog automobile that is luxurious, although primarily intended for taking

the service of the city of Detroit. This machine, which cost \$4,000, has a double-deck body, provided with doors on all sides, through which the dog cages can be slipped in and out.



A Dog Automobile Having 22 Compartments

There are 22 compartments in this body, and each is fitted up with a brass drinking vessel. A fresh-water tank provides the prisoners with water at all times. Especial attention is paid to the ventilation.

stray and unmuzzled dogs to execution, has been added to the vehicles used in

a full kit of veterinary surgical instruments, along with such medicines as

built by General Motors, at Pontiac, Mich

Lead
Walsh + Clark

might be needed for first-aid purposes, as it is also the intention to use the vehicle as a hospital van.

QUEER MONOPLANE HAS JAPANESE ENGINE 413

It would not, in Japan, strike a tourist as strange to find an aeroplane of

PERFORATIONS USED FOR NUMBERING PAPERS

In these days of card-index systems and office records of all kinds it is necessary to obtain a permanent record of all sorts of papers and to make many different papers for identification. A new system of perforating such papers with numbers and dates has just been perfected. The work is done with a machine and papers can be numbered and dated as fast as they can be fed into the machine, the number automatically changing with each impression. A number of papers can be also numbered at the same time with the same number. The machine has been developed after much study and experimenting, and in tests that have been made has been found to be most satisfactory in operation.

American Perforator Co., 631 W. Jackson Blvd. Chicago

PAPER INSULATION LASTS TWENTY-THREE YEARS

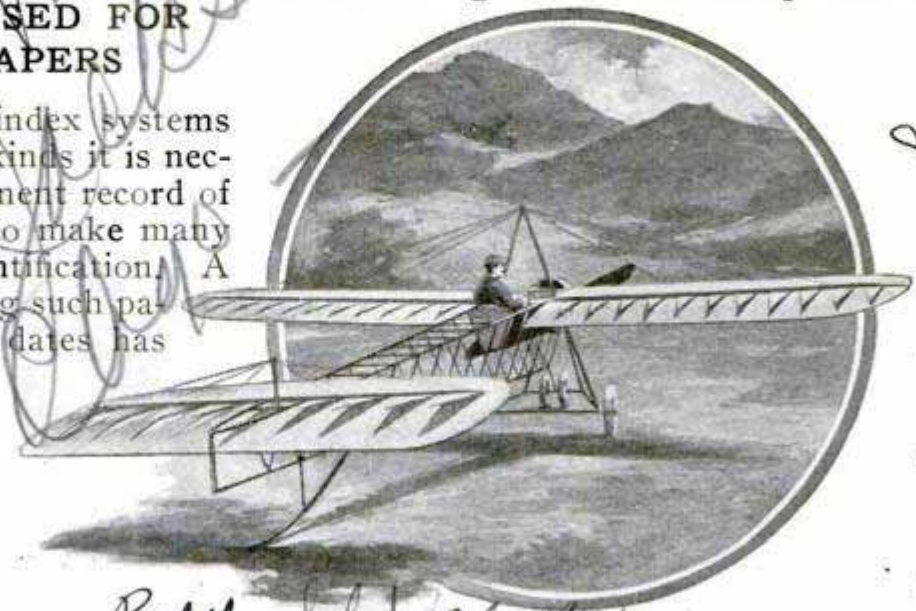
Despite the lack of knowledge in handling high-tension electric currents that existed in the early days of electrical development, a recent examination of the works of a big electric-supply concern in England showed parts of a cable, insulated with specially prepared paper and carrying a current of 10,000 volts, to be in the best condition, although it had been in constant use for 23 years. Leading scientists and electrical experimenters had declared that it was im-

possible to handle such a voltage on the cable, but it was constructed never-

theless. It consisted of a copper tube having a cross section of .25 sq. in. Over this was laid layer after layer of paper impregnated with an especially prepared wax applied under pressure. The paper insulation was 1/2 in. thick and over this was slipped another copper tube. The entire cable was then placed in a die which pressed the outer tube until it gripped the paper tightly. Lengths



The Paper-Insulated High-Tension Cable Which Carried the First 10,000-Volt Current 23 Years Ago. The Picture Shows Actual Size of the Cable



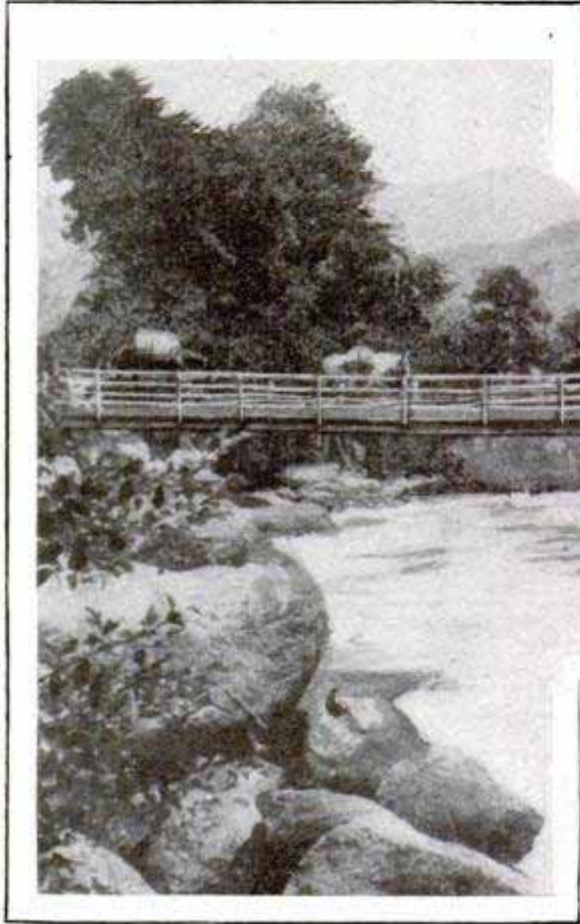
Patd. Sept. 26, 1911.

An Irish Monoplane Having Curious V-Shaped Openings in Its Sustaining Surfaces, and Equipped with a Japanese Motor

that country powered with an American or European engine, but it is certainly unexpected to find a new monoplane designed by an airman of Londonderry, Ireland, equipped with an engine of Japanese make.

Mr. Cordener, Londonderry, Ireland.

of 20 ft. were made at a time, and the sections joined by forcing a 10-in. copper rod for a distance of 5 in. on either side into the inner copper tube of two adjoining lengths. As stated, some of this cable is still in use and giving good service.



was transported from a distance, swung across stream and solidly fixed into place sufficiently high above the flood mark to escape the pressure of the water. The log at its smallest end is 4 ft. wide, hewn flat on the upper side, making a 3-ft. pathway. On account of its great length, although it rests at one point near the middle on a large stone, it sways and rocks considerably when several animals are crossing at the same time, and so side

Bridge, Made of Single, 100-Ft. Log, across Rapids of San Joaquin River

HUNDRED-FOOT LOG BRIDGE SPANS RIVER

In its upper reaches the San Joaquin River, California, rushes along through mountain gorges and rocky canyons, a dashing turbulent stream, alike unfordable and impossible of crossing by boat. Later on it becomes quiet enough as it debouches onto the valley plain. The bridges thrown across at different points are usually swept away, almost every year, when the San Joaquin comes down in flood from the melting of the vast banks of the Sierra snows.

This photograph shows an unusually substantial bridge which crosses the river at a point in the Sierra National Forest. It is made of a single huge log, more than 100 ft. in length, which

rails have been tacked on to lend an appearance of safety. The cost of erecting this bridge was about \$1,000.

LEADED SILK AS SAFEGUARD FOR X-RAY OPERATORS

An improved material for safeguarding X-ray operators from the danger to which they are subjected has been announced at the French Academy of Sciences. It consists of silk, heavily impregnated with lead and other substances, the result being an armor impenetrable by the rays. In the experiments with this lead-absorbed silk, gloves were made consisting of six thicknesses of it, and these gloves were used successfully. Gloves made of this material possess the advantage of being supple as well as providing adequate protection.

☞ New York City has 750 hotels—not counting the so-called Raines law hotels—with accommodations for 350,000 guests.

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OPENING THE WAY FOR GLASS HOUSES

Glass might be used to build houses if it could be made stronger and manufactured more cheaply than at present. Even now it is used much more than a few years ago, and Robert L. Fink, in a paper read before the recent International Congress of Applied Chemistry in New York City, predicts that not only will the house of the future be made of glass, but also pipes for water and many other articles of common use. The principal materials from which glass is manufactured are sand and lime, and these are the cheapest raw substances from which any building materials can be made.

Ordinary glass would be very much cheaper than it now is if it could be made entirely by machinery without too great breakage, and Mr. Fink has just made an important investigation of the reasons why glass breaks. In working with machine-made window glass, he found that 70 per cent of all the panes were broken before they were ready for market, and on some days it seemed as though all the glass made were lost, the breakage rising to 95 per cent.

Window glass is blown in the shape of

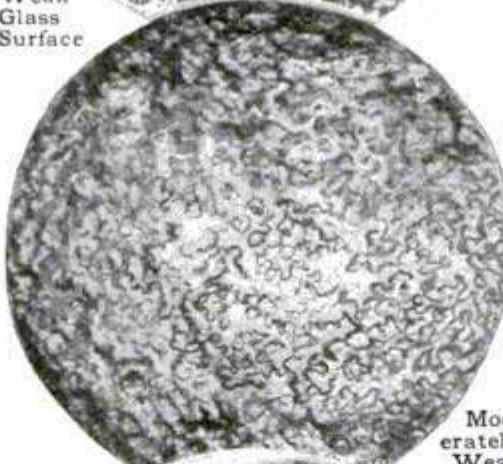


Strong Sheet-Glass Surface

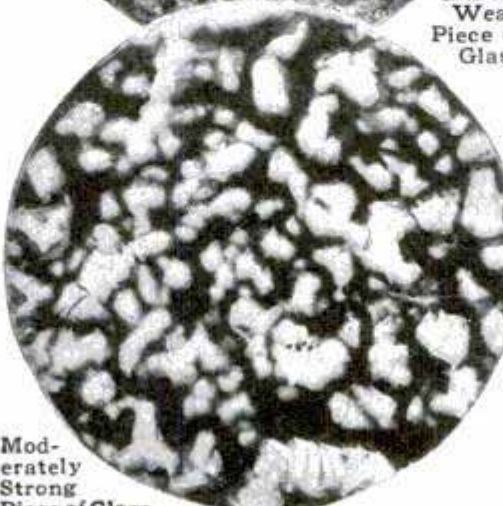
as Seen Under Microscope



Weak Glass Surface



Moderately Weak Piece of Glass



Moderately Strong Piece of Glass

long cylinders, which are cut open along one side, and then placed on a stone in a hot furnace, where they gradually collapse and flatten out into a big sheet of glass. Often the glass breaks during this process, or even explodes, forming thousands of pieces which shoot in all directions. Almost every one has seen "strings" in window panes, or lines where the glass is thicker. These often cause the glass to crack; in fact, whenever the entire pane of glass is not of exactly the same thickness, it is very likely to break. Fortunately for the buyer, very imperfect window glass usually breaks before the manufacturer gets rid of it.

The outward appearance of glass is, however, no sure indication of its strength and soundness and two pieces of window glass, looking exactly alike, may be very different in structure. By corroding the smooth outside surface of the pieces of glass with hydrofluoric acid and viewing them through a magnifying glass, these differences in structure and consequently in strength become evident.

The first illustration shows how the surface of a piece of very

strong glass, treated in this manner, appears under the magnifier, while the second is a picture of a very weak piece of glass. The latter kind usually breaks all to pieces before leaving the glass works. The appearance of the roughened surface of window glass of intermediate strengths is shown in the other illustrations. Thus the experienced investigator is enabled to tell whether the glass is likely to break or not.

By only making very strong sheets of glass, it is possible to reduce its thickness and, therefore, its cost, and a reduction of the breakage in the glass works would also make the glass very much cheaper. When glass can be made by machinery with only a very small amount of breakage, one may expect the glass houses of fancy to become a reality.

ANTI-HATPIN CRUSADE IN BAVARIA

In Munich there are regulations against wearing unprotected hatpins of dangerous length, the policemen and conductors of public conveyances being the arbiters who draw the "danger line." These officials are provided with



Conductor "Disabling" the Hatpin of Woman Passenger in Munich Street Car

protectors which they may attach, at their discretion, to the offensive end of the feminine passenger's or pedestrian's hatpin.

"EXPLOSION" LOCOMOTIVES FOR DESERT RAILWAYS

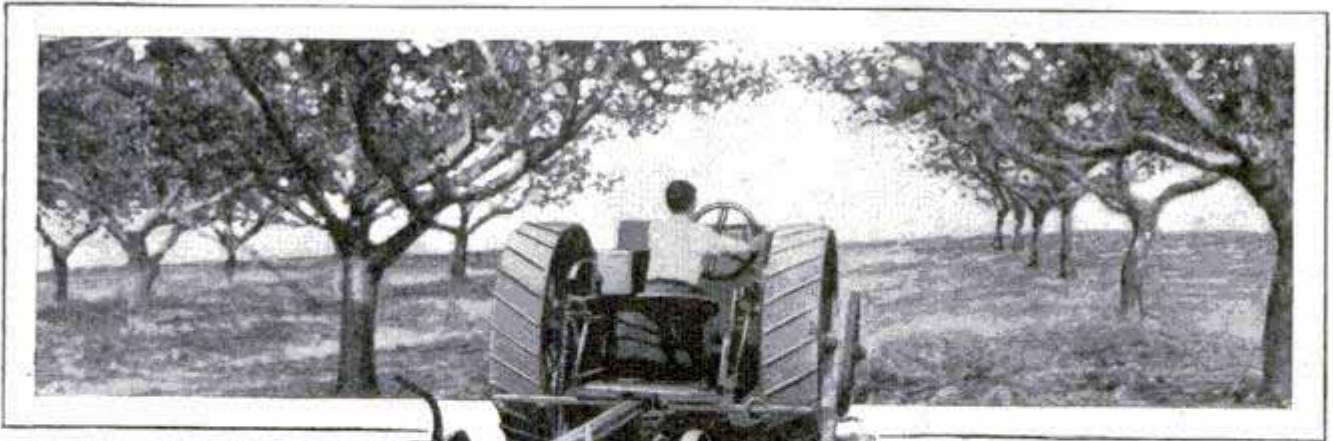
539 That locomotives of the internal-combustion, or "explosion" type may come into general use on railroads which pass through desert regions, where water is not easily obtainable, is being predicted by engineers. The Continental Railway of Australia, for instance, is an example of a line which, because of lack of adequate watering facilities along its right-of-way, has adopted gas and oil engines.

While the oil-fueled internal-combustion locomotive is economical in fuel consumption and operation generally, besides being practically smokeless, the high speed at which it must be run in order to produce a steady tractive effort is said to be a decided disadvantage, requiring special mechanism for the transmission of power to the driving wheels. Slow speeds are not possible for the reason that the intervals between the impulses on the pistons, caused by the successive explosions, would become too long and the momentum of the engine would not be sufficient to carry the drive wheels around, resulting in a jerky motion. Such difficulties may be avoided, however, by the use of electric motors, driven by the oil engine, and used only in starting the train, in hill climbing, and under other conditions that necessitate slow speeds. This method is adopted on certain South African railways.

ORCHARD TRACTOR DRIVEN BY BOY

658 A small orchard tractor, but 4 ft. in height, and driven by a boy, is shown in operation in the accompanying illustration, breaking ground in an orchard. It passes under the lowest limbs of the trees without causing dam-

Geo. H. Jones



Small Orchard Tractor Operated by a Boy Who Finds This Kind of Farming a Joy

age. The machine is 11 ft. long by 6 ft. wide, and weighs 4,000 lb. It is driven by a 12-hp. engine, has a working speed of $2\frac{1}{2}$ miles an hour, and can be turned, with a number of plows or other implements attached, in a 24-ft. circle.

STUDYING THE COLORS IN BRICK

Probably everyone has wondered why some bricks are red, and others are buff, yellow, white, brown, or some other color.

In different parts of the United States the brick colors are strikingly different, at least in the brick used for ordinary walls and not for front facing, so that an observant person who has lived in Boston, Washington and Chicago, for instance, would recognize which of these cities he was in if he were blindfolded and taken to an unfamiliar part of any one of them. Charles F. Binns and C. H. Makeley, of Alfred, New York, have just made an experimental study of the colors of brick. Bricks are made from clay and sand. Two of the most important constituents in clay are aluminum and iron. When bricks are made from clays which contain a large amount of aluminum and very little iron they are white, or nearly white; if moderate amounts of iron are present they are pale yellow to buff, while if the clays

contain little aluminum and much iron, the bricks are red. However, if this latter clay contains considerable lime as well, the bricks burn yellow, or very light yellow.

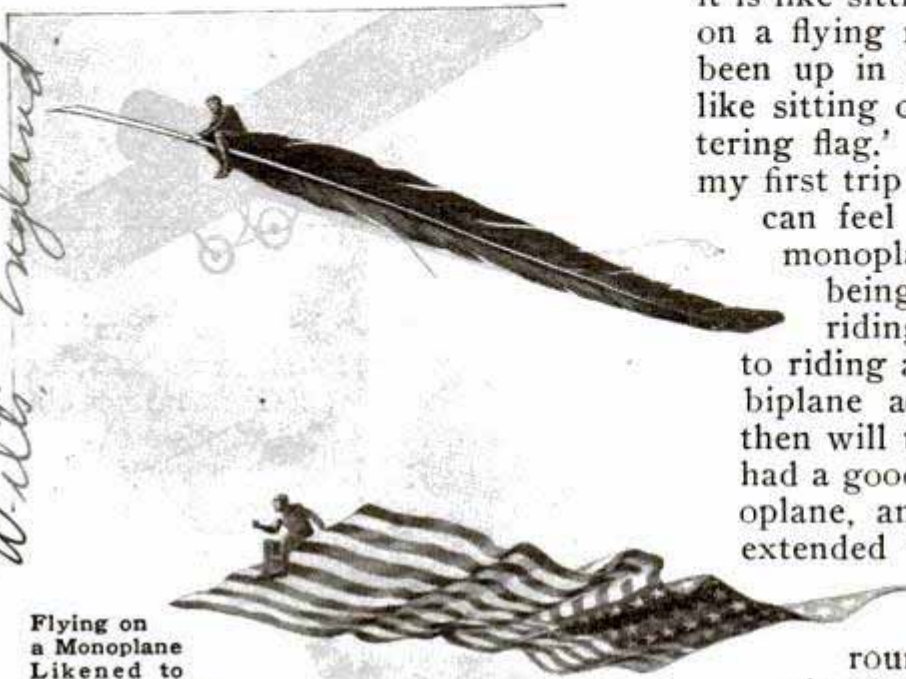
According to another investigator the colors due to iron may range through every shade from white to orange, red, blue, brown and even to black. The hotter the temperature at which the brick is burned, the darker is the color. At high temperatures, when very much iron is present, violet black or black bricks can be produced.

Binns and Makeley endeavored to produce red bricks by using a clay which gave a white brick and adding iron in the form of ferric oxide (rust), but they obtained the surprising result that the bricks were not at all red but only a pinkish gray. Therefore, they concluded that iron will not color bricks red unless it is present in a form which permits a more intimate mixing with the clay. When iron was used in the form commonly known as "fool's gold" (iron pyrites) a very interesting series of bricks in different shades of buff was obtained.

The colors of bricks which seem to be a bright light green or blue are usually due to a colored substance which is added to the enamel, but the colors which are here described are to be found inside as well as outside the bricks. When the art of coloring bricks by adding coloring substances is better understood, it will be possible to make the bricks themselves of almost any color.

606 IMPRESSIONS OF AERONAUT TURNED AIRMAN

The intensely interesting impressions of an aeronaut on first taking to the air in aeroplanes are here set down



Flying on a Monoplane Likened to Riding a Feather and on a Biplane to "Sitting on the Edge of a Fluttering Flag"

as extracted from a letter received from Captain Penfold, the well-known Australian balloonist. Captain Penfold spent some time in England recently, as a student of aeroplane flight, his first aerial journey on a heavier-than-air machine being with Hotchkiss, a British army airman who was killed with a companion just a few days later.

"The military airmen I have met in England," says Captain Penfold, "are fine in a good-natured, friendly way. I feel, myself, that the elements of danger bring out the good qualities of a man." And then he continues: "Let's hope I develop some myself;" which, since Penfold has for years flown in balloons, might raise the question, whether or not flying in aeroplanes develops different qualities than making a parachute drop from a gas-filled bag.

"In my first trip up," says Captain Penfold, in describing his sensations, "I felt the speed and wind against my face, but by the third trip was quite at

home, although I had also to become accustomed to the noise of the propeller. I have heard people say that it is like sitting on a blancmange to be on a flying machine, but I, who have been up in a fair breeze, consider it like sitting on the 'top edge of a fluttering flag.' A day or so ago, I had my first trip up on a monoplane. You can feel the least movement of a monoplane, and, compared with being on a biplane, it is like riding a feather as contrasted to riding a house. I intend to fly a biplane at first in Australia, and then will take to the monoplane. I had a good look around on the monoplane, and seemed to get a more extended view as regards distance than on a biplane. Perhaps the absence of surrounding wires gives a clearer view."

NEW SUPERDREADNOUGHT LAUNCHED IN ENGLAND

Great Britain's largest battleship, the superdreadnought "Audacious," was launched not long ago, at Birkenhead, in the presence of 1,000 invited guests and many times that number of spectators who crowded pleasure boats and the wharves. The "Audacious" is a sister ship of the "Ajax," but she is better equipped than the latter in the matter of armor, her side armor being 12 in. thick and extending nearly two-thirds the length of the vessel. Forward and aft the plate is 6 in. thick. The ship will be able to fire a broadside of 12,500 lb. from ten 12-in., 45-caliber guns as compared with the broadside of 6,800 lb. of which the ships of the dreadnought type are capable. The displacement of the "Audacious" is more than 23,000 tons, and she will attain a speed of 21 knots (24.18 miles an hour). She is fitted with four screws. The total cost of this giant among battleships will reach close to \$10,000,000, exclusive of her armament.

Aeromant, Post office Amesbury W. Vt. England

MEASURE WIND VELOCITY WITH ELECTRICITY

Electrical measure of wind velocities is now possible with a device utilizing the conflicting properties of platinum and manganin. The flow of current through platinum is easily affected by changes in temperature while the flow through manganin remains practically even. Therefore what is known as a Wheatstone bridge is made with two arms of platinum and two of manganin wire. If after the current flow through the two substances has been balanced, the apparatus is exposed in a current of air, the wires will be cooled, an operation which does not affect the manganin but does affect the platinum, lowering its resistance and allowing more current to flow through it. To restore balance, the current through the manganin arms must be increased. This increase in current is therefore a measure of the cooling effect or velocity of flow of the wind, and the apparatus, being extremely sensitive, will thus furnish a means of computing very accurately slight variations in the wind velocity.

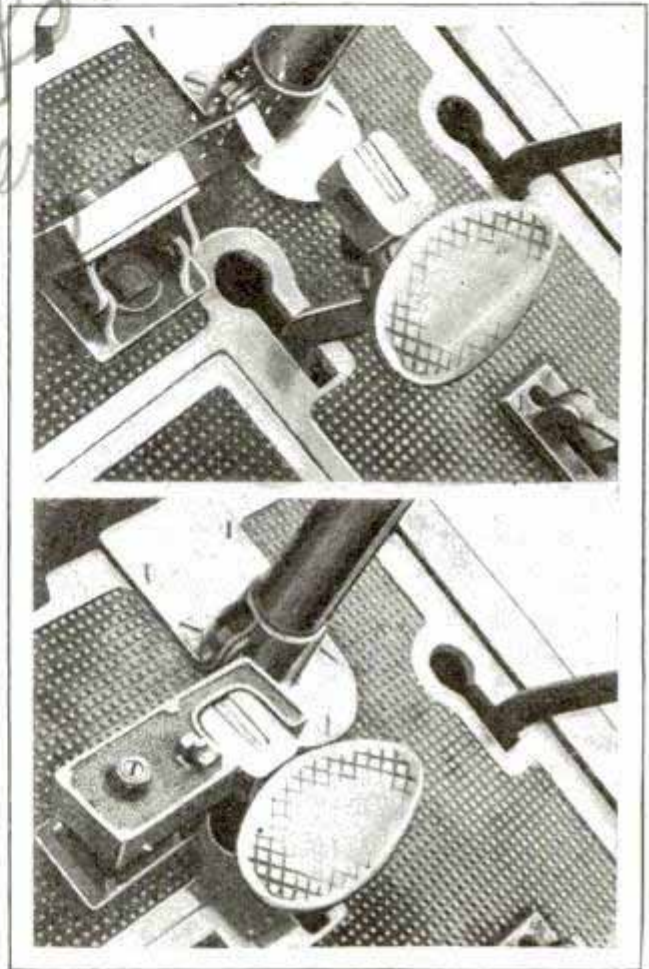
UNDER-WATER SIGNAL SYSTEM FOR NAVY

Experiments were made recently by the navy with a submarine signal system, designed especially for use should the wireless outfit be shot away, and brought to this country from Hungary by Count Szechenyi.

In the installation of the apparatus on battleships, the sending is accomplished by stretching a wire from side to side of the vessel at such tension that it will produce a high musical note when vibrated by an alcohol-soaked, silk-covered disk, revolving at high speed. The sides of the vessel act as a sounding board. The water is, of course, a splendid transmitting medium. The receiving apparatus of the outfit is the ordinary sensitive microphone of the wireless operator. Levers and springs control the application of the motor-driven disk to the wire.

MOTOR-CAR LOCK GRIPS CLUTCH LEVER

An ingenious lock has been devised for automobiles, which secures the clutch of the car so that it cannot be



Automobile Locked by Device Which Secures the Clutch Lever. Above, the Lock Open; Below, the Clutch Locked

started without unlocking with a key. When not in use, it is thrown out of the way, but as it is hinged to the foot-board of the car it is always ready for use. The lock is of bronze, and of a stout construction that prevents it being easily broken or filed.

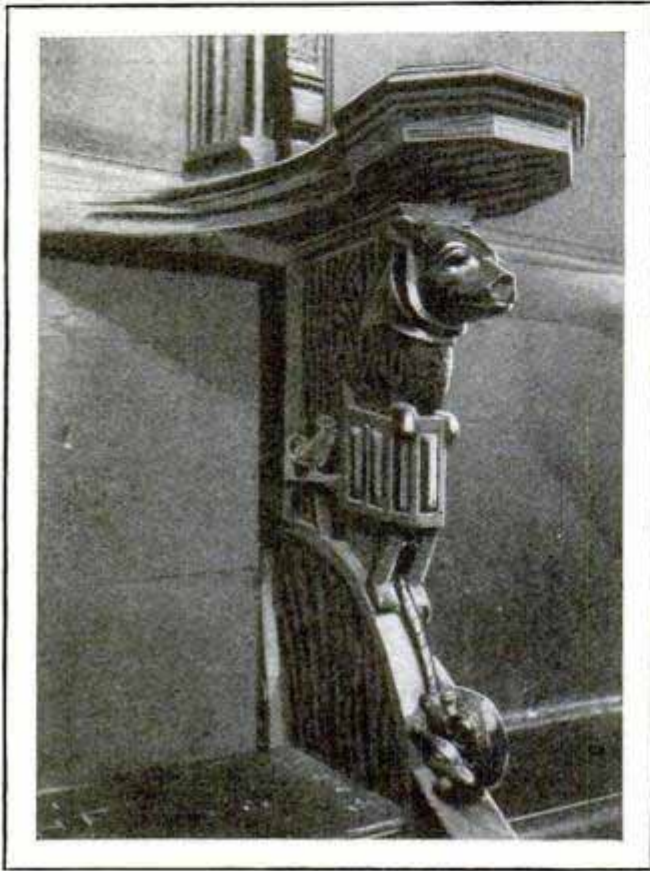
CHURCH CARVER SHOWS FOX PREACHING TO GEESE

There are many quaint things to be found in the old churches of England and this is especially true of those structures having heavily carved decorations of wood. One of the oddest spectacles is found in an old London edifice where the ends of the pews and benches are elaborately carved. In this particular instance the end of a bench

Wireless Co

Handwritten note: A no. a Hungarian, Vice-President

furnished the raw material for the carver's work, and he has shaped a most curious and seemingly out-of-place ornament. The figures show a fox in a



Carved Bench End in English Church Which Shows a Fox Preaching to a Congregation of Geese

monk's cowl occupying a pulpit and preaching to a lot of geese which are held together with a string which passes into the pulpit. Mounted in the background is the figure of a rooster crowing. There is nothing to indicate the carver had any reference to the reverend gentleman who occupied the pulpit at the time his work was done or to the members of the congregation.

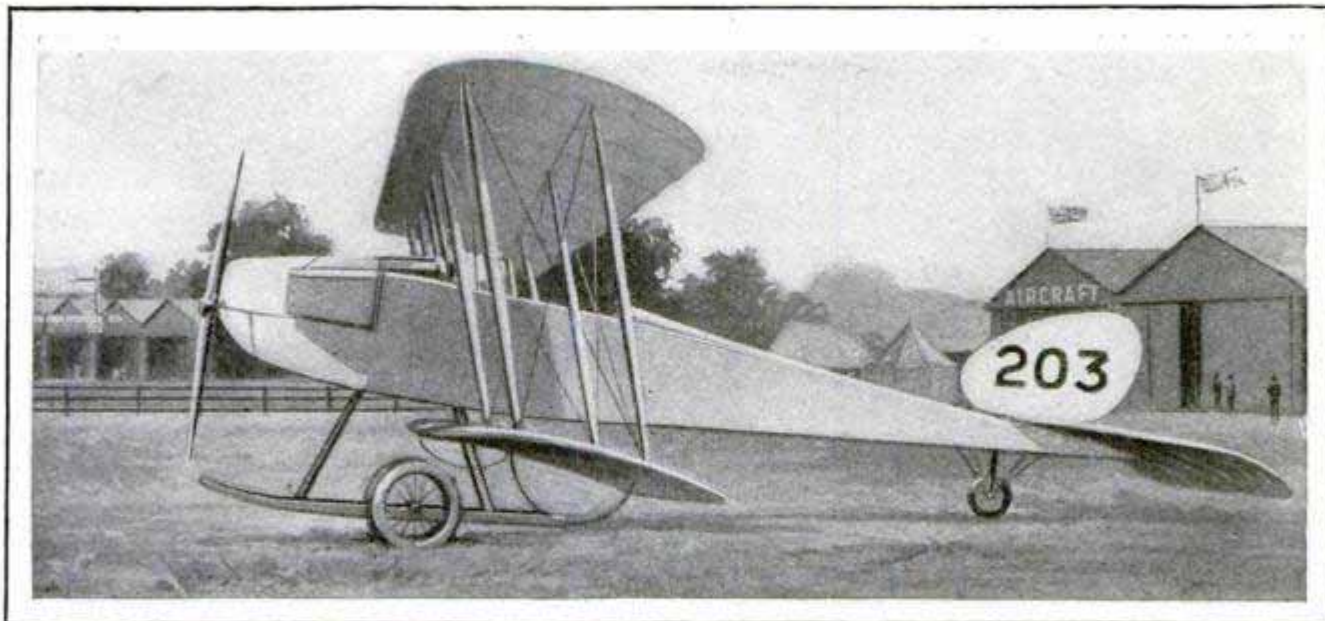
REPAIRING ARTERIES WITH GLASS TUBE

Among the latest experiments of Dr. Alexis Carrel, recently awarded the Nobel prize for notable achievements in surgery, are some on animals, in which he used rubber, glass and metal tubes in the chest portion of the aorta, the large artery which carries the blood from the heart. Sometimes this portion of the aorta becomes enormously dilated into a sac called an "aneurism,"

which sooner or later will burst, causing instant death.

Previous attempts to cure this condition have consisted in passing a coil of fine silver wire into the sac with the idea of causing the blood to first clot, then organize into solid tissue, thus partially obliterating the sac but allowing the blood current still to pass through it. Carrel's experiments have been conducted on dogs with the idea that it might be possible to cure an aneurism by substituting a glass or metal tube for the dilated portion of the vessel. The chest is opened by an incision between two ribs, and held open by means of so-called retractors. Silk ligatures or threads are passed around the aorta and an incision of the required length is made, lengthwise of the aorta, and while the blood flow is stopped in the vessel by means of clamps on each side of the incision, the glass, aluminum or goldplated aluminum tube is passed in and the silk ligatures then tied around each end of the tube, whereupon the incision in the artery is sewed up.

In one instance a portion of the wall of the aorta of a dog was cut out and a piece of rubber inserted and covered with tissue. Fifteen months afterward the blood was circulating through it in a normal manner. In another instance a piece of vein was substituted for a portion of the descending or abdominal portion of the aorta of a dog. The animal died two years afterward of an epidemic disease and his aorta was found to be working all right up to his death. Eleven experiments were performed with glass or metal tubes on the chest portion of the aortas of dogs and during the first week following the operations nearly all the animals were in excellent condition. On seven animals glass tubes were used; on three, aluminum tubes, and on one, a goldplated aluminum tube. The animals died in from five to 97 days after the operation, and in each instance it was found that the death was caused by a blood clot due to too large a tube, to the rough edge of the tube or to corrosion of the metal tubes, all of which are conditions



British Military Biplane of the Type Constructed in the Government Shops

easily preventable by the use of properly constructed tubes of just the right size. Doctor Carrel says the permanent intubation of a large artery is a comparatively simple operation; that it is probable that the use of smooth-edged gold tubes, or of tubes lined with a vein, will be followed by better results; and then the application of this method to human surgery may be considered.

MOTOR CARS TWO TO ONE ON MASSACHUSETTS ROADS

Two-thirds of the vehicles passing over the highways of Massachusetts are automobiles, according to the count made recently by the highway commission of that state. For the entire 155 stations on the state roads where count was made, the percentage of motor vehicles was 67, to 33 for horse-drawn vehicles. A total of 60,200 vehicles were counted, of which 40,391 were motor-driven, and 19,809 horse-drawn. Of the motor-driven vehicles, 32,072 were of the touring-car type, 6,555 were runabouts, and 1,764 were motor trucks.

The scarcity of motor trucks is attributed to the fact that the majority of the trucking by motor is done within the limits of cities, comparatively few running regularly over state highways, and none of them operating on park roads.

BRITISH MILITARY BIPLANE OF ADVANCED TYPE

By reason of the fact that the British war office barred the use of monoplanes in the grand maneuvers in England because of the death of several officers of the army in accidents with these machines, the biplanes owned by the government and especially those built by the war office workmen, came in for thorough testing. All of the machines behaved well, but the army officials were especially pleased with the machine built at the royal aircraft shops.

The machine most liked was a biplane of the tractor type in which the streamline form was followed not only in the construction of the body but of the struts as well. The maneuvers were brought to a sudden close because of the extreme usefulness of the aeroplanes, the movements of both armies being so plainly seen by the aerial scouts that there was no chance for working out problems on the ground.

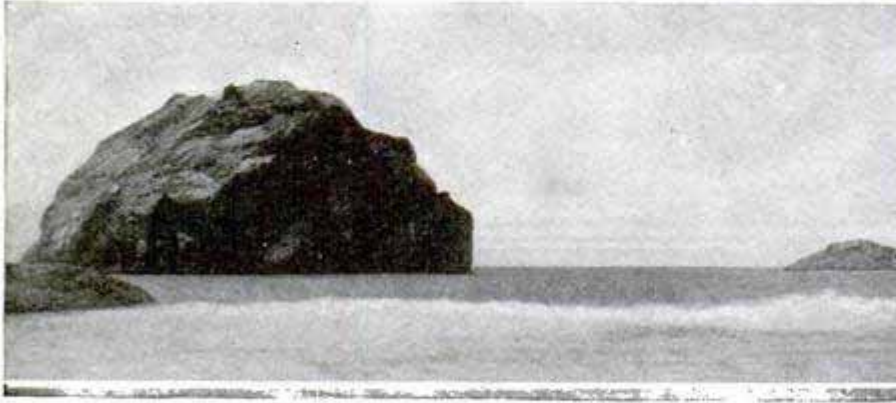
☞The universal garden about American dwelling houses and the absence of fences or hedges were the things the hosts of scientific foreign visitors to the United States last fall found here that attracted their attention most particularly.

Boston Transcript

**GREAT ROCK RESEMBLES
HUMAN HEAD**

667

A great rock, rising out of the water on the coast of Oregon, near Brandon, is a striking example of nature's often



Great Rock Shaped by Nature into the Form of a Face and Head

demonstrated aptitude as a sculptor. The lines of the face and reclined head are clear-cut and excellently proportioned. It is called "Sphinx Rock."

**THE ACTION OF RADIUM
ON DIAMONDS**

W03

That the effect of radium on diamonds is marked has been shown by Sir W. Crookes, who imbedded several stones in radium bromide. One of these diamonds was originally of the purity of water, but the radium caused it to assume a beautiful color, which is very pronounced, and has proved to be unaffected by long-continued heating in strong nitric acid and potassium chlorate, as well as by heating it to red-

ness. The diamond brought into prolonged contact with radium also becomes radioactive to an extent, which persists after drastic treatment.

**BULLOCK POWER ON ROOF OF
TURKISH BATH**

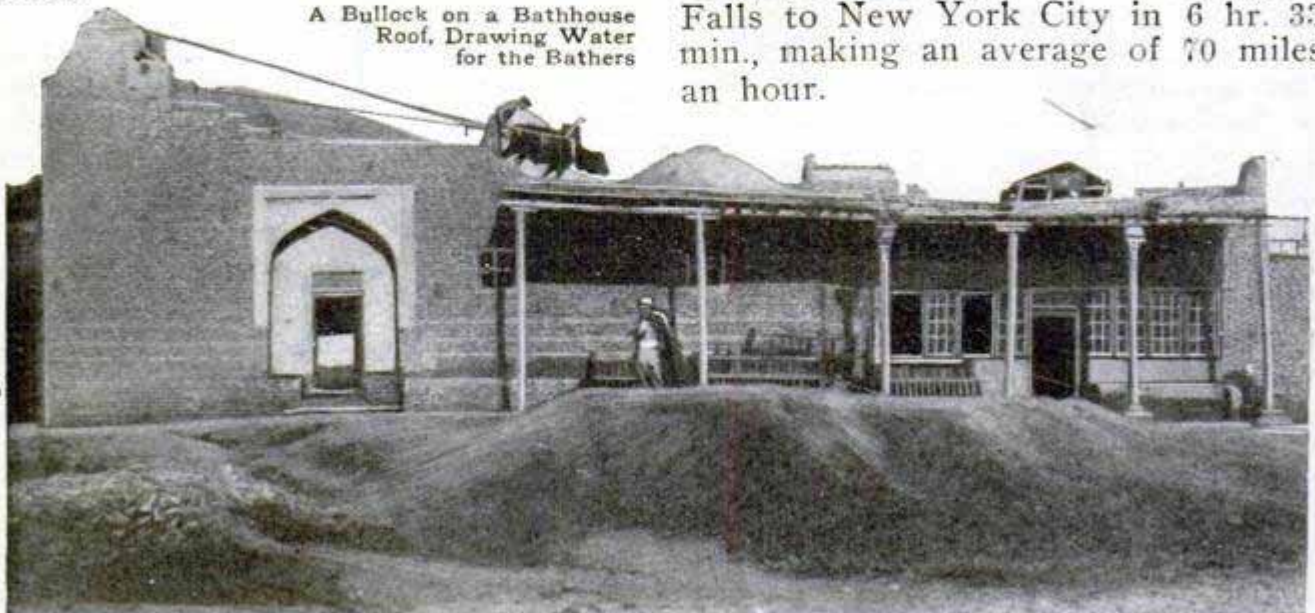
521

Bagdad, in Asiatic Turkey, is noted for its baths, maintained for both men and women. On the roof of one of the bath buildings in the town of Koot, an Arab suburb of Bagdad, is an inclined runway on which a bullock is used in drawing water from a well for the baths.

A Bullock on a Bathhouse Roof, Drawing Water for the Bathers

This primitive system of elevating water by means of a skin used as a bucket and a rope running over a wheel, is widely known in Arabia and is called the "cherrid." These cherrids are common along the Euphrates and Tigris Rivers, where they are used for irrigating the date gardens.

CA pigeon recently flew from Niagara Falls to New York City in 6 hr. 33 min., making an average of 70 miles an hour.



mt. Fred Smith American
mular Service, Chas. A. ...



IS YOUR INTENDED HOME WELL BUILT?

By M. W. DOUGLAS

“HOW can I tell whether or not a house I want to buy is well built, so it will not require repairs that amount almost to rebuilding?” asked Mr. Neidow of his visiting uncle, an architect of experience.

“If you have one in mind, we will look it over together,” he offered.

“There are several I am thinking of, particularly a bungalow near here, though I may decide to build, or simply to lease.”

“Then let’s look over the bungalow, and let me tell you as we go over it what to look for in the case of almost every home, and you can apply much of it to the others,” suggested the elder Neidow.

By telephone, permission to look over the bungalow was obtained, and in a few minutes they reached it, and were welcomed into the little home.

“Let us start at the cellar,” suggested the elder Neidow, “though it is more customary for a prospective buyer to be shown the prettiest parts of a house first.”

As soon as they reached the cellar, the elder Neidow, taking a rule from his pocket, measured the height from floor to ceiling, stating that the height of the basement ceiling should be at least 7 ft. where a furnace is used, in order to allow the hot air to travel upward and give the flues sufficient pitch. If in an ordinary dwelling the basement height is less than 7 ft., sufficient ventilation cannot be obtained if the basement is used for laundry or other purposes.

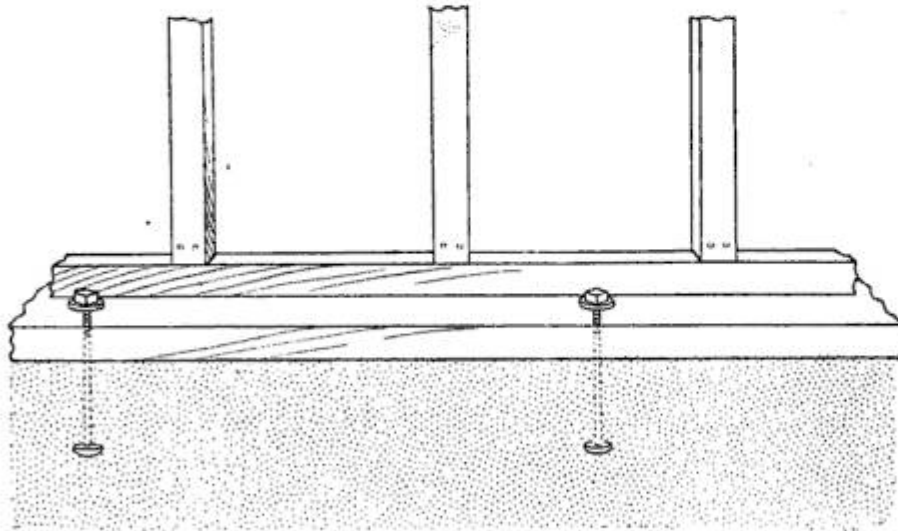
“An important point in buying a house,” he said, “is to see that the footings and foundation are substantially constructed, because the entire superstructure depends on the foundation. If possible, ascertain the depth

of footings under porches and depth of foundation walls, to see whether they will be affected by frost in any way. Also see whether the wall will be affected by water seeping through from outside.

“Where a concrete foundation is used, see that the walls are made of a dense mixture and that they are plastered on both sides clear down to the footing.” (The foundation of this particular bungalow was of stone, and the elder Neidow stepped out to see whether the outside at least was plastered.) “The mortar used for brick or stone foundations should be a pure cement mortar, and unless it is of dark gray, you can be positive that there is a percentage of lime water mixed in, which always weakens the foundation wall. Care should be taken to see that the foundation wall is of sufficient width to support the weight it carries. Damp soil affects the foundation and, no matter of what material the foundation is composed, dampness will invariably penetrate the foundation and cause an unhealthy cellar. For damp-proofing in an ordinary dwelling, where the rains penetrate the earth and settle around the basement wall, one of the best methods is to lay farm tile around the building and branch off about 40 ft. away to lower ground. The tile should not be closely jointed together, and it is necessary that they be covered on top so that no soil or sand can penetrate to the interior. The sides are to be left open so that water can flow into them. The top of the tile should be covered up to the grade with clean beach gravel. A stone foundation should also be plastered $\frac{1}{2}$ in. on each side with a mixture of sand and cement, after which a coat of asphalt should be applied on

the outside wall clear down to the bottom of the footings.

"If stone sills are used in the foundation, they should be thoroughly inspected for rot and disintegration. Stone sills should also be laid according



Wall Plates should be Anchored to Foundations to Prevent Shifting in a Gale

to stratification or their natural bed. The floor of the basement, if of cement, should be fairly tested."

This was done by taking a block of wood, weighing about 20 lb., and dropping it upon the floor in different places.

"If the floor sounds hollow, there is insufficient concrete below the finished surface, whereas, if the floor has a solid, substantial, dead sound you can be certain that the concrete is of sufficient thickness.

If the heating system is installed, the ceiling of the basement directly above the furnace should be plastered with cement plaster on metal lath so as to protect the joists from heat. Ascertain, if possible, whether the wall plates are anchored to the foundation wall and bolted. This is frequently neglected, but is necessary for even the simplest dwellings. I have known cases where an ordinary 10-mile gale has shifted buildings to the extent of one or two inches by the sliding of the wall plates.

"If the joists are not visible, their size can be ascertained by measuring the ceiling and deducting the difference for floors. The floor load is figured at 60 lb. per foot for an ordinary building

and, according to this assumed load, the joists should be of sufficient size to carry the load; thus 2 by 8-in. joists, spaced 16 in. from center to center, with plaster below, should not run over 12 ft. in length; 2 by 10-in. joists, similarly spaced, should not run over 16 ft. See,

if possible, whether the headers around stairwell openings, fireplaces, etc., are double or triple. It is necessary that they are at least double. Also joists under partitions should be double or triple. Examine the joists carefully, to see whether they have been cut for piping. See that the joists are well bridged and that spans of 12 ft. and over have

at least two rows of bridging.

"The ceiling joists, if there is no attic in an ordinary dwelling, carry a 20-lb. load, including their own weight, lath and plaster; and a 2 by 4-in. joist for this purpose should not exceed 11 ft. If there is a floor in the attic, the joists should, of course, be increased in size to carry the floor and a 20-lb. floor load in the attic besides. Also look up the carrying capacity of beams and timbers when inspecting a residence.

"Now, let us take the size of studing into consideration. A 2 by 4-in. stud is sufficient for an ordinary bungalow of this kind. In the examination of a bungalow, the framing of the studs should be carefully inspected. The next step is to look for defective timber. Note how the ribbons or girths are framed. Examine the junction of joists, at girth or ribbon, for the possibility of plaster cracking. Also note how the studs are held in position by the joists.

"Sheathing paper should be selected for its warmth and durability. A waterproof paper is necessary in a damp climate. The ordinary red-rosin paper has proved to be satisfactory in the central states. The studdings af-

fect the plaster and the settlement of the building as much as the joists, and if not braced in a substantial manner, a jar or vibration will cause the plaster to loosen. When inspecting framing material in general, a person should bear in mind the properties of different woods grown in the United States. The order of the various woods arranged according to general strength and carrying capacity is as follows:

"Hard pine or southern yellow pine, beams; white oak, red oak, spruce, Oregon pine or fir, hemlock.

"There is no test on hemlock material for framing, but it is known to have only one-half the strength of southern yellow pine. Oak is seldom used for framing, as it is undesirable for many reasons, the main reason being that it bends very easily. Yellow pine, of all American woods, is considered the best obtainable for framing purposes, on account of its great carrying capacity. Knots are permissible in framing lumber, but large, loose knots, dry rot, sap and pitch pockets should be avoided.

"Now let us go up to the attic and examine the construction of the roof. One of the most important parts of a building is the roof and one of the greatest faults, in the ordinary dwelling, is the skinning of the roof by spacing the rafters too far apart, by not putting in sufficient collar beams and not nailing hip rafters and jack rafters well. To obtain a substantial roof and one that will bind the building together as it should, where the span of rafters is over 12 ft., they should be of 2 by 6-in. material, placed 16 in. from center to center.

"A 2 by 4-in. rafter can be used for spans shorter than this, but it should be placed 16 in. on centers; in fact, care should be taken that all rafters are placed 16 in. on center, especially if 1 by 4-in. material is used for roof

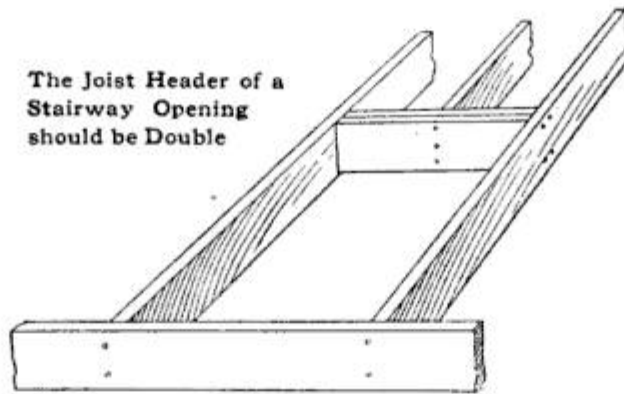
sheathing and shingles. A roof that is not solid and one that vibrates can never be relied upon wherever the rafters are spaced too far apart, even though they are braced in some places, as it allows a bending of roof boards, which of course displaces the shingles to a certain extent, and allows nails to pull themselves out eventually. The above defect should be avoided, and as a roof rafter is usually visible in the attic, it is an easy matter to determine whether you have a substantial roof or not.

"Dressed and matched roof sheathing is essential only where a plastered ceiling is required in the attic. Then it is necessary to place a waterproof paper over the roof boards, so that there will be no moisture or drippings to dampen the plaster. A spaced roof sheathing

is more desirable where an open attic is preferred, as it allows shingles to dry out below as well as on top after a rainstorm. If slate is used, care should be taken that the rafters are of sufficient strength to

carry the extra weight of this material. Solid roof sheathing should be used for this purpose and heavy slater's felt should be placed upon it. A rigid inspection should be given the slates. There are many poor slate roofs on account of inferior slate being used. Hence it is necessary to test the slate before accepting it. A good slate should be hard and tough and should give a sharp metallic ring when struck with the knuckles. Softness or liability to abrasion does not indicate inferior roofing slate. A common and easily applied test for roofing slate is to place one on edge to one-half its depth in water, and if in 12 hours the line of absorbed water approaches the top, it should be rejected. If it does not rise over $\frac{1}{8}$ in., the slate may be considered as practically nonabsorbent and safe.

The Joist Header of a Stairway Opening should be Double



"Now let us go out and examine the porch framing. Our first step is to see that the roof girder is of the proper size and is put up substantially. All porch ceilings and soffits should be finished with ceiling about $\frac{5}{8}$ in. thick, driven up close and blind-nailed with the proper-size nails. The porch flooring must have at least a $\frac{1}{4}$ -in. drop to every foot in depth so that water will flow off easily. Also see that all the columns, newels, rails and balusters are well nailed and put up in a proper manner.

"The material for outside finish is the next important thing to consider. There are various kinds of wood used for this purpose, but the best obtainable at the present time is cypress, the so-called wood eternal. If this wood is properly painted and taken care of immediately after it has been nailed on the building, it will last indefinitely. When we come to examine cypress, we must see that it is free from wind shakes and heart shakes, these being two of the most important defects of this wood.

"While we are talking about outside finish, let us take the matter of window and door frames into consideration, as they are most usually made of the same class of lumber as the outside finish. A frame with outside casing made of clear cypress and the pulley stiles of clear yellow pine is the most desirable, as these two woods are noted for their strength and durability. Where casement windows are used in a bungalow, a watertight sill is essential. Let us examine the frames and see whether they are set correctly, and that the sill is of the proper pitch.

"Now let us go back inside and look over the interior trim, doors and windows. It is an easy matter to detect the poor quality of material used for the interior, as it is very hard to stain

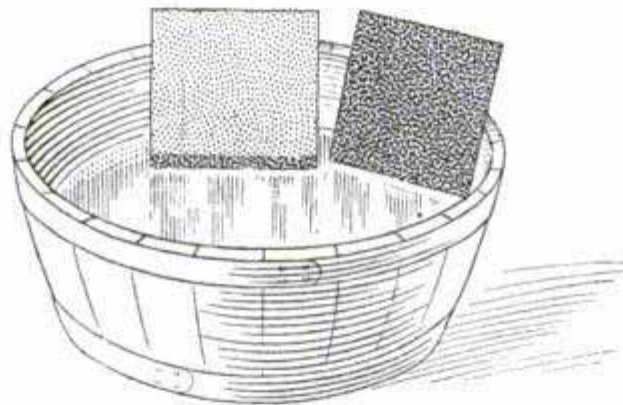
or varnish oak or yellow pine so that the defects of the wood will not show. The majority of bungalows at the present time are trimmed in oak throughout and also, with few exceptions, we can find that the dining room, sitting room and, in fact, all rooms, with the exception of the kitchen, pantry, closets, bedrooms and attic, are trimmed in oak."

They found that the floor was of quartered white oak, being well laid. The elder Neidow tested the floors by jumping on them and trying to cause a vibration, which will show up weak spots of a floor, if there are any.

"Where there is a deflection, even of $\frac{1}{32}$ in., there is danger of plaster falling off the ceiling below," he explained.

"While the moldings and trim of a

room are the most important features, still nothing adds more beauty to a room than a well manufactured door," he continued. "The eye is attracted by the beautiful grain in the panels and it is a sort of aid to the surroundings. There are very few



By Half Immersing Slates in a Tub of Water the Quality of the Slate may be Determined

homes where the important feature of doors and windows has not been neglected. The great majority of people are not in a position to acquire the necessary information, and it is not due entirely to lack of artistic temperament, but rather because the selection in many cases is left to others who are not familiar with the subject.

"The windows or sash should be made of clear white pine, at least $1\frac{3}{8}$ in. thick, being well manufactured and properly fitted with durable hardware. Where the sash are not divided into small lights, they should be glazed with double-strength glass.

"The cabinet work, that is, window seats, mantel shelves and buffets, should also be thoroughly examined. If the material used in construction of these

cabinets is not thoroughly kiln-dried, the panels will warp and the drawers will swell.

"Let us examine the plastering and lath. White pine is generally considered the best wood for lath, but spruce and hemlock are also used a great deal. If you should notice stains on the plaster, you can, in nine cases out of ten, lay the blame on the bark on the laths. All lath should be well seasoned, free from sap and dead knots. Three coats of plaster are necessary for a first-class job, and each coat should be permitted to dry before the next is applied; and under no circumstances should the finish coat be applied before the second is thoroughly dry.

"The fireplace should be selected not only for ornamentation, but also for heating and ventilation. For ventilating purposes alone, a fireplace is a valuable asset to any residence. One must be careful to see that the damper is properly located and of sufficient size to carry off all smoke and impurities. There should be a smoke pocket constructed just above the damper, to create extra draft. All linings should be examined, to see that the fireplace is perfectly fireproof. The hearth should be solidly constructed and an ash dump provided. When a fireplace is used for coal and wood, it should have a solid foundation and the floor joists and headers should be doubled and tripled around it.

"The plumbing and sewerage is one of the most important parts of a residence, as it has a great deal to do with the health of a tenant or owner of a dwelling. The arrangement of sewerage and reventing of same should be carefully studied so that there will be no chance of any sewer-gas leakages. Each bathtub, lavatory and toilet should have a separate revent so that

all gas will be carried to the roof at the highest point.

"On the whole," concluded Mr. Neidow, "this house is well built. I shouldn't be surprised to learn that it had been erected by a builder for his own home, and you would make no mistake in buying it.

"Now, let me make out for you when we are back home a simple table of the things to consider, in order to keep clear the points we have noted here," said Mr. Neidow, and later he gave his nephew the following memoranda:

- Footings: Kind of soil and supposed pressure; depth of footings necessary; width of footings necessary.
- Foundation Walls: Examination of material used in construction; how made; how soil will affect same; damp proofing.
- Construction of Outside and Inside Walls: Size of studs; kind of sheathing paper and siding and how laid; effect on plaster and settlement of building.
- Roof Construction: Loads to carry; kind of roof; spacing of rafters; testing of slate, etc.; effect of weather.
- General Framing: Kind of material; how framed; headers and trimmers; examinations of openings and corners.
- Porch Framing: Girders; joists and bearings.
- Material for Outside Finish: Kind of material; weathering properties; condition of material.
- Material for Inside Finish: Appearance; joints; how finished; flooring.
- Kind of Doors and How Hung: Make of doors; kinds of wood; size and thickness; door jambs; hanging.
- Kind of Windows and Sash and How Hung: Kind of wood; how made; thickness; glass and glazing; hanging.
- Kind of Frames: Material used; pocket room; pitch of sill; weathering properties; setting of frames.
- Lath: Kind; spacing of same; nails; corners and angles.
- Plaster: Material; application; finish.
- Chimneys and Flues: Framing around same; linings and size of them.
- Fireplace: Kind; throat, flues and arches; dampers, etc.
- Cabinets: Examination of doors and drawers; construction; thickness of shelving and other parts; tendency to warp.
- Ventilation: Location of windows and doors; kind of heat; height of ceiling; circulation of air.
- Light: Number of windows and location; position of building; kind of light and lighting fixtures.
- Heat: Kind; radiation and location of registers or radiators; kind of radiators.
- Electrical Wiring: Kind permitted; conduit; location of outlets and switches; kind of wiring and gauge of wire.
- Gas: Testing of pipe and examination of fixtures; location of outlets.
- Plumbing: Reventing system; location of bathroom and fixtures; sewerage and disposal of same; water supply and fixtures.
- Interior Decorations: Wall paper; staining; color schemes.
- Painting: Kind; color.



GERMAN "AIR-YACHT" CLUB PENNANTS

Every province and large city in Germany has one or more societies devoted to aerial navigation with the



lighter-than-air types of aerial craft. Each of these societies has its special badge or pennant, which is worn by the members, appears on its stationery and official communications, and is flown from the balloons and dirigibles. In this, the aeronautical clubs, composed of men who sail the air, follow the practice of yacht clubs. Likewise, in both the aerial and the water clubs are many members who take interest without active participation, and these are spoken of as members of the "rocking-chair fleet."



CHINESE REPUBLIC ENDS OLDEST NEWSPAPER

The suppression of the Chinese newspaper "King-Bao," the title page of which was reproduced in this magazine a year or so ago, by Yuan Schi Kai, president of the Chinese Republic, ends the career of the oldest newspaper in the world. For approximately 1,500 years



it has published the more important news of China, and lately also of foreign countries. The paper was started in the year 400 A. D., and issued regularly until recently. The first edition was printed on 10 sheets of yellow silk, neatly tied together, and was sent to all the high officials of the empire.

OPERATING HOTEL WITH TELAUTOGRAPH

Instead of telephoning to various departments in a great hotel now being erected in Washington, all orders will be sent around by the telautograph, a machine which writes out at one station what an operator writes on a pad at another station. Ninety instruments will be used at the start, with the idea of eventually extending the service to every guest room. Every girl at the telephone switchboard will have a transmitter at her right hand. As orders come from guests, they will be written on the transmitter, near which will be a switch enabling the operator to send the message to any one of 14 places in the hotel or to several of them at the same time. Telautographs will be installed in the bar, the baggage room, the kitchen, the dining room, the ball rooms, at the desk of the head bell boy, at the clerk's desk, at the cashier's desk, in the chief porter's office and in the writing room.

All orders involving paid service will be transmitted to the cashier's desk, where, as in other hotels using the system, every chargeable item will be recorded so that it cannot escape the notice of the cashier or bookkeeper.

USING PRESSED STEEL IN AUTO ENGINES

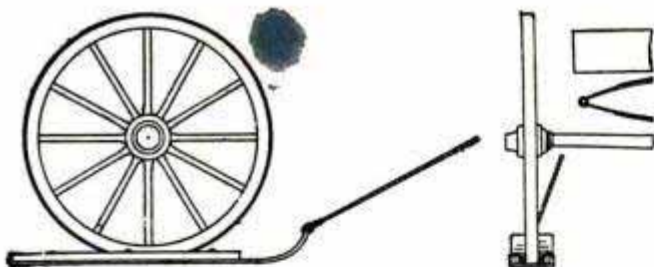
Pressed steel as a substitute for heavier cast or forged parts on motor cars has been used very effectively, but that pressed-steel connecting rods could give satisfactory service would, in view of their extreme lightness as compared with the drop-forged variety, seem doubtful. Yet in England pressed-steel connecting rods are used in a number of the best makes of motorcycle motors, and the results obtained are said to be even more satisfactory than with the heavier rods, for while they are sufficiently stiff to withstand all strain, the lightness makes for the production of a smooth-running motor and renders the bearing wear very slight.

*Scientific American
10-1-1912*



A Wagon Brake

While traveling through the mountains with a horse and carriage, I found the brake shown in the illustration exceedingly useful. It is constructed as follows: The base is made of an iron wagon tire, 28 in. long and 3½ in. wide, with a slight curve on the front so that it will not catch in stones or other obstacles which are firmly set in the roadbed. The sides are made of 1-in. square hickory sticks bolted to the base with three bolts for each guide, the rear ends being curved to allow the wheel to enter easily, and a hole is punched in the front for a rope or chain, the other end of which



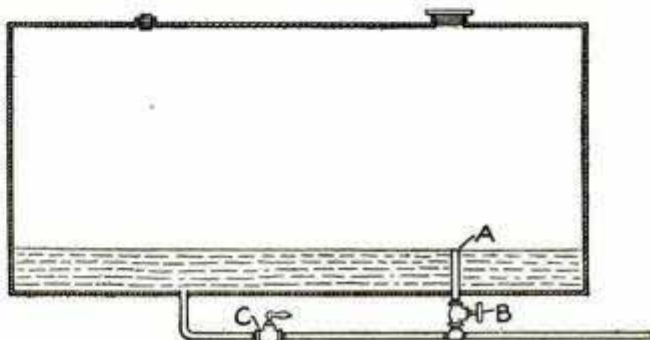
The Wheel is Easily Run on the Brake Which Drags on the Ground

is attached to any stationary part of the wagon. If the wheel is allowed to rest in the center of the brake it will effectively hold the wagon on a steep grade.—Contributed by W. C. Thompson, Millington, N. J.

To Keep a Reserve Supply of Gasoline in a Tank

Provide an extra hole in the bottom of the tank and insert a piece of pipe A. The pipe should extend 2 or 3 in. above the bottom of the tank or sufficient to make the desired amount of reserve supply. The connecting pipe to the engine is attached to this with

a globe valve B. The gasoline is drawn from this connection first and after the gasoline has reached the level of the pipe A there will be sufficient gas-



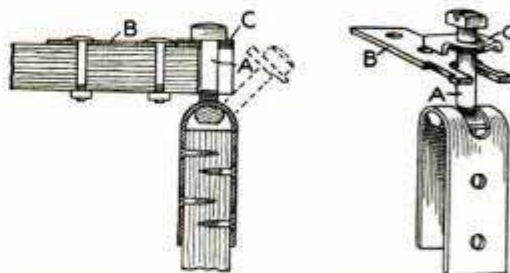
The Pipe Extending into the Tank Provides a Reserve Supply of Gasoline for Emergency Use

oline left in the bottom to run a car several miles, or to the nearest place where a supply can be obtained. The reserve supply is drawn through the valve C.—Contributed by J. H. Stearns, Dayton, O.

To Fasten Covers on Shipping Boxes

This device for fastening the cover of a shipping box is intended to make it easier to open the box than if it were nailed or screwed in place, besides which the box will be undamaged and can be used over and over again.

The device consists of a U-shaped



Boxes Equipped with These Fasteners can be Used for Shipping Goods Over and Over Again

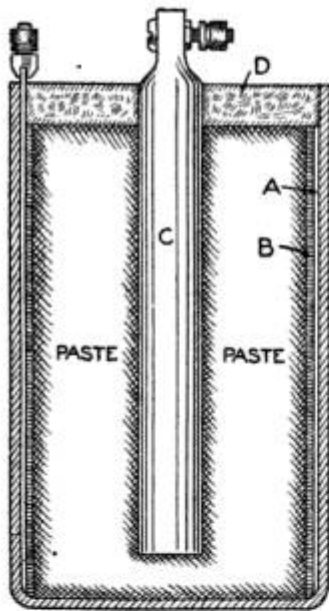
iron band, fastened to the sides of the box, having at the upper curved end a slot wide enough to admit the T-

shaped head of the bolt A, which is a trifle longer than the thickness of the cover. On top of the latter is bolted a piece of band iron, B, slotted at the front end to admit the screw bolt, A, and with cut-outs on the side edges in which the turned-down edges of the plate C become engaged when the screw-bolt A is screwed down, thus locking the device.

In order to prevent the opening of the box in transit, a piece of wire may be inserted through a hole in the head of the screw A and another in the locking plate B, and the two ends sealed with a lead seal similar to freight-car door seals.

New Form of Dry Battery for Long Life

Procure a glass jar, 3 in. in diameter and 6 in. high. Place a zinc cylinder, A, $2\frac{1}{8}$ in. in diameter and $5\frac{1}{8}$ in.



long, in the jar. Line this on the inside with thick blotting paper, B, and set a carbon, C, in the center — a carbon from a discarded dry cell will do. Make a paste as follows: Mix three parts water and one part muriatic acid by adding the acid to the water. Next thoroughly mix

four parts of crushed charcoal, two parts flour, and one part plaster of Paris, all parts being measured by volume, not by weight. Then, thoroughly mix this powder with the liquid and fill the jar up even with the top of the zinc. Finish by filling the jar with sealing wax, D, and the cell will be ready for use two hours after completed.

The ordinary dry cell would last much longer but for the evaporation of the acid after it eats through the

zinc. The battery described will give current until all the zinc is consumed. —Contributed by G. Henry Jones, Auburn, Ala.

Applying Gravel to Roads with a Manure Spreader

In a locality where a large mileage of gravel and rock roads had been constructed, farmers discovered a method of laying the material uniformly and with a minimum of afterwork.

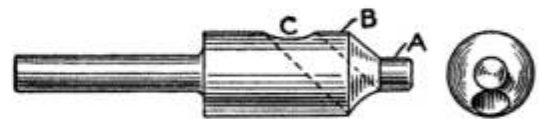
Several of the farmers owned manure spreaders of the kind that have low-hanging, easily detached beaters, and automatic tail gates. They removed the beaters, took the loads of the material they could haul, drove out upon the road to be treated, threw the machines in gear at a speed that was required to make the proper application of the material, and it was spread in a uniform layer on the roadbed.

Some of the men with an implicit faith in their machines did not even go to the trouble of removing the beaters. — Contributed by Louis Schneider, Clinton, Mo.

A Countersink

Carpenters and cabinetmakers have considerable trouble to countersink a hole in wood for the head of a screw, as the grain of the wood is liable to run in any direction and throw the countersink off center. The illustration shows a tool that has proved invaluable in making a true and clean countersunk hole.

The tool can be made of tool steel, if desired, but the one I have is turned from a piece of machine steel and case-hardened. The end A is turned to fit



The Shape of the Cutter and the Manner of Relieving the Chips Make the Countersink Cut Straight

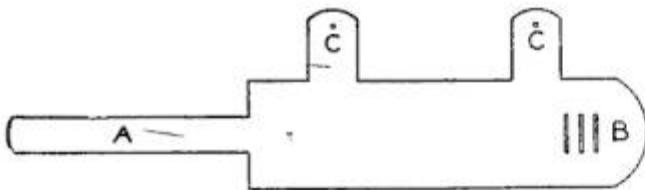
the hole in the wood and the part B is the size of the screw head. A hole, C, is drilled diagonally through the metal, the diameter being the distance

from the shoulder A to the outside of B on the tapering surface. The tool will cut whichever way it is turned.—Contributed by C. Cain, College Point, Long Island.

A Brush Bridle

Many devices have been made to take the place of the old-time twine bridle on paint brushes. Some of these devices have been patented and others have been given free to the public. Here is an idea that, as far as I know, is new in making a bridle of thin metal, such as tin or brass, with the edges filed off slightly to prevent them from cutting the bristles. The shape of the piece of metal for the bridle is shown in the sketch. The size can only be determined by the size of the brush on which it is to be used.

The metal is placed around the part of the bristles next to the stock, and is fastened by inserting the tongue A



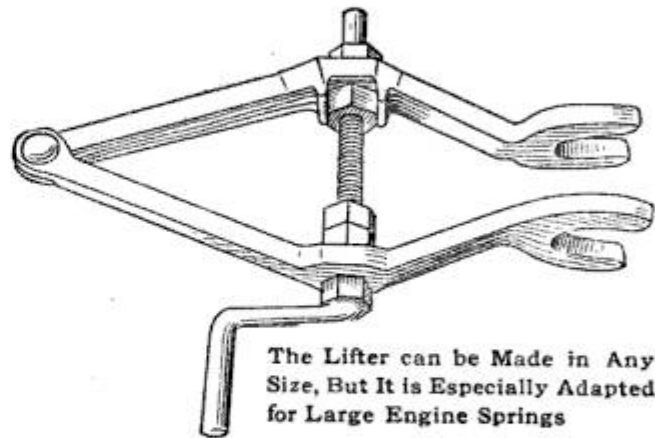
The Shape of the Sheet Metal as It is Cut to Form a Bridle for a Brush

into and through the slits at the end B. The projections CC are tacked to the top of the stock in the place where twine bridling is usually fastened.—Contributed by A. A. Kelley, Malvern, Pennsylvania.

A Gasoline-Engine Valve Lifter of Large Capacity

The valve lifter shown in the sketch was especially designed for use on a large gasoline engine used on a tractor. The tool is about 9 in. long, the rod is $\frac{3}{8}$ in. in diameter and 7 in. long with a thread cut for 4 in. of its length, the remaining unthreaded portion being formed into a crank. The loose nut fits into a socket on the inside of one of the arms, which prevents it from turning with the crank. The

two nuts which are turned up against each other, are locked on the rod so that they turn with it. They also form



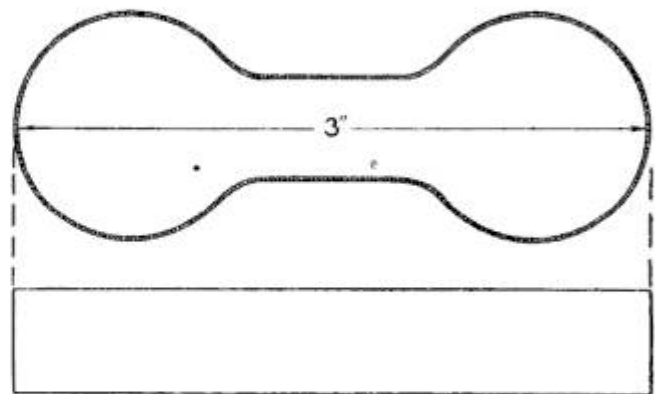
The Lifter can be Made in Any Size, But It is Especially Adapted for Large Engine Springs

a shoulder which faces against the lower arm when the tool is opened. The loose nut forms the shoulder against the upper arm.—Contributed by A. B. Webb, Richardton, N. D.

To Make Cement Tests

When the winter weather sets in, a large number of mechanics start experimenting with anti-freezing compounds for use with cement to prevent concrete from freezing before it sets. To obtain accurate tests a uniform mold must be used.

The illustration shows a form for making briquettes for testing. The mold is made from fairly heavy sheet metal, preferably brass, and is bent into the shape shown in the sketch. A piece of metal is soldered on the out-



The Shape of This Mold Gives $\frac{1}{4}$ Sq. In. of Cement for Making a Test

side of the joint so that the form will be even and smooth on the inside. A piece of glass is used for the bottom, the form simply resting upon it and

a spatula is used to smooth off the top. The mold is 3 in. long with the narrow part $\frac{1}{2}$ in. square. This gives $\frac{1}{2}$ sq. in. to test and two ends on which to apply weight. Tensile-strength tests per square inch are as follows:

Time of Test	NATURAL CEMENT		PORTLAND CEMENT	
	Neat	Cement, 1 Part Sand, 2 Parts	Neat	Cement, 1 Part Sand, 3 Parts
1 day	65 lb.		150 lb.	
7 days	120 lb.	50 lb.	450 lb.	140 lb.
28 days		100 lb.	540 lb.	220 lb.

When making briquettes for testing purposes, a crushed quartz or Ottawa sand should be used which will pass a No. 20 sieve but be held on a No. 30.

All neat briquettes should be immersed in water as soon as set, and those made of mortar should be im-

mersed in water 24 hours after being made. All briquettes are kept in water until ready to be broken and to undergo the above tests.

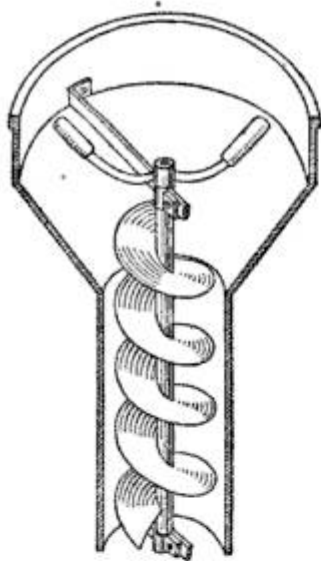
The initial set of first-class Portland cement should not take place in less than 30 minutes, and the final set in not less than 3 nor more than 8 hours. The initial set of natural cement should not take place in less than 10 minutes.

This information can be used for a base from which to test with various chemicals, etc., always making a briquette of clear cement and sand, with which to compare the tests after submitting them to the same weather conditions.

Packing Flour in Sacks

Flour may be easily packed in sacks, ranging in size from 6-lb. to 48-lb. capacity, with the use of a packer such as shown in the illustration, which is an invention of a correspondent of the American Miller. The packer consists of a tube and a double spiral conveyor with a flanged top. The flour will be packed before it leaves the tube

at the bottom. The operation of the device is obvious.



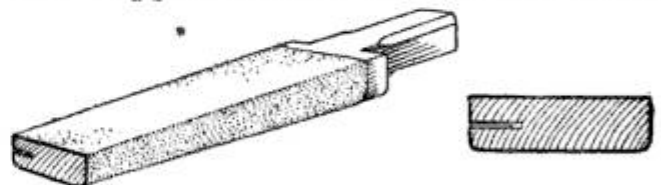
Purifying Air in Rooms

To purify the air in offices or sick-rooms, use the following method: Soak a few pieces of ordinary brown wrapping paper in a solution of saltpeter and then allow them to dry. When desired for use, lay a handful of flowers of lavender on a tin pan with a few pieces of the paper and light them. The aroma is refreshing and agreeable, and

drives away insects. Another good way is to put a few drops of the oil of lavender into a glass of very hot water. This purifies the air at once and rids the room of flies and insects. Rooms treated in this manner are kept free from these pests for several days.

A Sandpaper Stick

A convenient way to use sandpaper on model work, patterns, etc., is to have a sandpaper stick. A good stick may be made of soft pine of convenient size, or several can be made of different sizes. The stick is cut out as shown in the illustration, with a tapering grip or handle at one end, which has a saw cut on one side and two corners rounding. A piece of sandpaper wide enough to extend around the stick and allowing sufficient end for fastening it in the slot, is folded and slipped on the end of the stick.



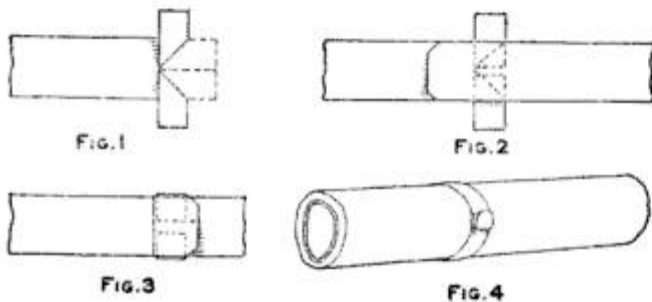
The Sandpaper is Wrapped around the Stick and Kept in Place by the Taper and Slot

The paper is securely held by the taper fit. The stick has one flat side, two flat edges, two sharp corners and two round corners, which may be of

different radii, making a very handy combination. Where considerable work is to be done, a stick for each grade of paper is most convenient.

Bands for Pipe Covering

While applying asbestos covering on heating pipe, the workmen ran short of holding bands and instead of taking time to procure them, the few necessary to complete the job were made up as follows: One end of a strip of tin, cut as wide as the desired band, was split in the center as shown by the dotted line in Fig. 1, and the two parts bent outward and hammered down flat. After placing the band around the covering, the opposite end was laid across the two parts, as shown in Fig. 2, and their ends turned over



One End of a Tin Strip is Cut and Formed to Hold the Opposite End When Placed around the Covering

as shown by the dotted lines in Fig. 3. Then the end of the strip was turned back after drawing the band up tightly. The substitute band, in place, is shown in Fig. 4. This band, while only a substitute, will hold the covering as firmly as the ordinary band.—Contributed by Geo. Gluck, Pittsburgh, Pa.

Filling Steam Lubricators When the Oil is Cold

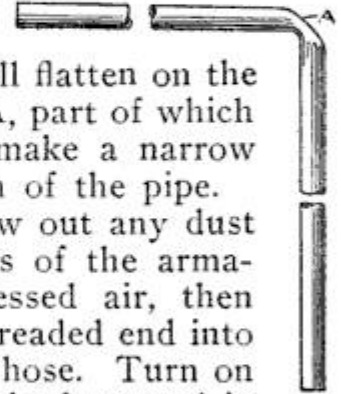
When both the lubricator and the oil have been allowed to cool, it is rather hard to fill the reservoir. A good way to do this is to open the valve at the bottom, allowing the water to run out, and at the same time begin pouring in the oil. The water running out will draw the oil into the reservoir.—Contributed by Kenneth Moore, Byron, Ill.

Spraying Insulation Liquids into Armature Windings

The sprayer is made of a piece of $\frac{1}{4}$ -in. brass pipe, 21 in. long, bent at right angles at a point 9 in. from the threaded end.

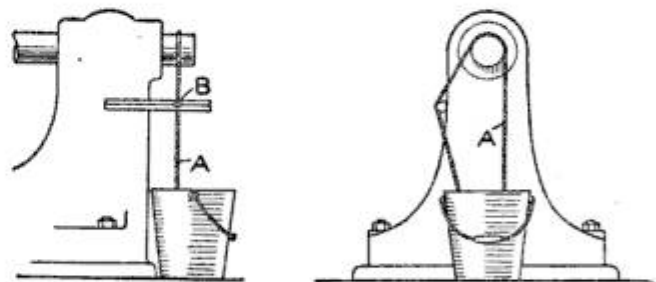
In making the bend the metal will flatten on the upper side, as at A, part of which is filed away to make a narrow opening the width of the pipe.

Thoroughly blow out any dust from the windings of the armature with compressed air, then screw the short threaded end into the end of the air hose. Turn on the air and place the long end in a vessel of air-drying insulating paint—a quart bottle, or anything easily held in the hand, will do to hold the paint. The result is a spray of paint driven to every part, thoroughly insulating the creases and crevices that cannot be reached with a brush. The paint, as it comes prepared, is usually too thick and must be thinned with gasoline. A little experimenting will enable one to prepare it so that the sprayer will drive the liquid easily. After spraying the windings, allow the armature to dry for over a half hour before using it.—Contributed by L. E. Jay, Elyria, O.



Cooling a Hot Bearing

A temporary remedy for a hot bearing, where the machinery cannot be stopped for the time, is to cool it in the manner shown in the sketch. A



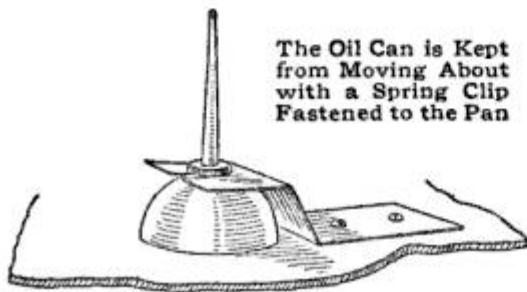
The Belt Running in the Cold Water Carries a Portion of It Up on the Revolving Shaft

small rope or leather belt, A, is placed over the end of the shaft or where it is near the heated bearing and its lower

end hung in a pail of cold water. A stick with a notch, B, for the belt is attached to the machinery to keep the belt traveling near the bearing on the shaft. The cooling water will be carried up on the shaft by the belt. A bearing can be kept sufficiently cool by this method until the machine can be stopped for more permanent fixing.—Contributed by P. C. Fish, Kansas City, Mo.

Oil-Can Holder for an Automobile

This handy and simple little device to keep the oil can of an automobile from moving about was designed by

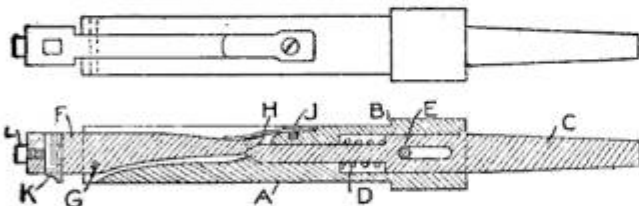


The Oil Can is Kept from Moving About with a Spring Clip Fastened to the Pan

a correspondent of the Automobile Dealer and Repairer. It consists of a brass clip fastened to the pan beside the engine, on the steering side, by means of two small bolts and nuts, and so shaped that the spring in the metal will hold the can securely.

A Tube-Cutting Tool

Having about 8,000 No. 20 gauge brass tubes, 1 in. in diameter, to cut exactly 8 in. long, I designed the following tool which was used very successfully in a hand milling machine. A piece of tool steel, A, was turned a running fit for the inside of the tube to



The Tube to be Cut is Pushed on the Tool, Which Cuts Off the Metal Automatically

be cut as far as the shoulder B. At this point the diameter was increased $\frac{1}{4}$ in. This was drilled to receive the plunger C, which was fitted to the

taper in the milling-machine head. A compression spring, D, throws the sleeve A forward against the pin E, which is a driven fit in the plunger C. A tool holder, F, pivoted on the pin G, is kept tightly against the end of the part C with a flat spring, H, fastened to the part A with a screw, J. The cutting tool K is made of high-speed tool steel and is fastened in the holder with the setscrew L.

The distance from the shoulder B to the inside of the tool K must necessarily be the required length of the tube to be cut. In action, the tool is placed in the head of the milling machine which is set in motion. The tube is held in the hands and slipped on the part A until it strikes the shoulder B. A little pressure applied causes the cutter to be forced outward into the metal. When the metal is cut through, the springs D and H return the parts to a position ready for the next cut.—Contributed by W. B. Studwick, Minneapolis, Minn.

A Knife for Extracting Slivers

To extract a sliver that is imbedded deeply in the flesh prepare a knife blade as follows: Take the penknife to be used for the purpose and place the blade on an oilstone and draw it from the heel to the point, raising the handle as the blade is moved over the stone. This rolling motion will produce a hooked feather edge near the point, which, when caught against the sliver, will draw it out while the ordinary edge would slip off.—Contributed by M. E. Tyler, Batavia, N. Y.

Line for Drawing Electric Wires in Conduits

A piece of chain such as used on the "pull" electric-light sockets, about 3 ft. long and attached to the end of an electrician's "fish line," will prove a great help when fishing through very crooked conduits, fixtures, etc. The nature of the chain allows it to lead around bends very easily and its weight will keep the line taut.

A Private Ice House

By FRANK L. RUSSELL

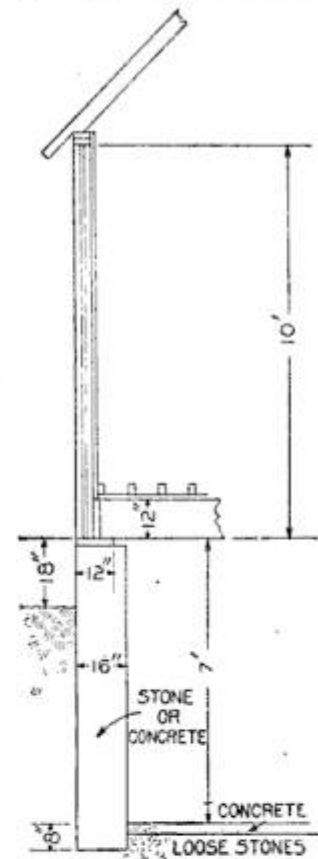
The suburbanite or the country dweller who has no way of securing ice during the summer months finds the use of an ice house indispensable to keep dairy products, fruits, etc. A house from 10 by 12 to 12 by 14 ft. and 8 or 10 ft. high will cost very little to make, and the owner will be well repaid in the results secured by having ice for use at all times. Such a house can be filled during the winter at a reasonable price, and the ice stored will be sufficient to take care of all the refrigeration for any ordinary household during the summer season.

The ice must be well protected from heat, air and moisture, and in order to do this the walls must be well insulated to prevent heat entering at the sides, the space above the ice well ventilated to remove the moisture from the air, and the drainage perfect to remove any dampness from beneath. Houses may be built of stone, brick, concrete or wood, the latter being preferable, as dead air spaces can be formed, which are the best non-conductors of heat and cold, thus lessening the thickness of the wall and making more space available for ice storage. The ice that is best to store is that which is frozen solidly, as it keeps much better than packed-snow ice or honeycomb ice.

It will be seen that the method of sill construction is quite materially changed from the ordinary, for the purpose of making two air spaces, beginning on top of the plate resting on the concrete or stone foundation, whichever it may be, and extending to the plate on top of the studs, forming a double space without any chance of circulation. The studs, instead of standing with their edges out and in, are placed flatways with the side of the building and set staggering to make the triple wall. The boards forming these walls may be ordinary undressed lumber, but it is best to use matched material, and for this reason

the accompanying material list will name, in all instances, the best for this building. In either case, the boards should be covered on one side with a good grade of tar paper, and the paper should be tacked to the studs on the inner side of the outside studs before the boards are nailed in place. The outside sheathing is put on, then a layer of paper before nailing on the siding boards. The paper is put on the inner surfaces of the inside row of studs and the wall boards are then nailed in place. Care taken in making the three walls as nearly air-tight as possible will prevent great loss of ice in the hot season of the year.

The drawings show the construction of a house having a cold-storage room beneath the ice room, and a small room at the end for a stairway to enter the cold-storage room, also an ice-washing sink with plenty of extra room for a refrigerator or dairy utensils, as the case may be. If the builder does not care to have a cold-storage room or the small room at the end, the house need not be any larger than the size of the ice-storage room, and the roof may be put on as in making an ordinary house, with the exception of the crosspieces which carry the chain hoist, and the ventilator at the center of the ridge. Of course, double doors must be hinged at the upper part of one end or in the gable through which the ice cakes are taken



Section Showing Detail of Wall Construction

the accompanying material list will name, in all instances, the best for this building. In either case, the boards should be covered on one side with a good grade of tar paper, and the paper should be tacked to the studs on the inner side of the outside studs before the boards are nailed in place. The outside sheathing is put on, then a layer of paper before nailing on the siding boards. The paper is put on the inner surfaces of the inside row of studs and the wall boards are then nailed in place. Care taken in making the three walls as nearly air-tight as possible will prevent great loss of ice in the hot season of the year.

by the traveling chain hoist. The roof is extended outside of the first pair of rafters to form a covering and a support for the end of the track for the hoist, which must extend outside of the house at least 4 ft.

The excavation for the storage room is 6 ft. 2 in. in depth and 12 by 14 ft. outside measurements. The floor of this room is made of concrete, laid over a bed of loose stones. If the bed of loose stones is made deep enough and a drain tile laid in them and connected to an outside drain, so much the better, as this will provide a way for drainage for the whole structure, and make it completely sanitary.

When a cold-storage room is built beneath the ice room, the floor of the latter must be so constructed that it will carry away any dripping water from the ice above. One of the sketches shows the construction of this floor. After laying the joists in the usual manner, they are further built up of 2 by 4-in. pieces so as to make the floor slope from both ends toward the center of the room. The floors should be made up of slats, about 1 in. wide and $\frac{7}{8}$ in. thick, and in nailing them in place a 1-in. space should be allowed between the pieces. These are then covered with sheet zinc and the joints soldered. The joints should all be turned and a seam made as in laying a tin roof. At the center, which will be the lowest point in the floor, the zinc sheets are joined to the sides

of a zinc trough sloping to one side of the building. At this point it is connected to a drain pipe, having a trap to prevent any air from entering. The lower end of the pipe is run through the concrete floor of the cold-storage room and into the loose stones, where the dripping water is carried away into the drain tile or taken up by the earth. Care should be taken to have the joints in the zinc floor, trough and drain pipe soldered tightly to make it air and water-tight. The ice should not be laid upon the zinc floor, as it is apt to tear the metal, and as a protection, 2 by 4-in. pieces are laid on the zinc, as shown, running from the ends to the center, or drain trough. The pieces should not be nailed through the zinc floor, but are held upright by crosspieces placed between them near their ends. The weight of the stored ice makes it necessary to place a sill through the center beneath the joists to prevent them from sagging. The sill should be supported at the ends by setting them in the wall and in the center by a post which rests upon a good-sized stone or concrete base placed in the earth beneath the concrete floor.

The cold-storage room should have two openings, one on each side, through the foundation walls above the surface of the earth, for windows, which are fitted with frames and double sash. This construction may be better understood by the detail of the corner of the building. The entrance door

List of Material

FLOOR JOISTS AND SUPPORTS

- 1 sill, 8 by 8 in., 14 ft. long.
- 1 post, 6 by 6 in., 7 ft. long.
- 27 joists, 2 by 12 in., 12 ft. long.

STUDS

- 141 studs, 2 by 4 in., 10 ft. long.
- 34 studs, 2 by 4 in., 16 ft. long.

MATCHED WALL BOARDS

2,500 sq. ft.

ROOFING

Prepared roofing sufficient to cover 520 sq. ft.

SIDING

Enough to cover 720 sq. ft.

TAR PAPER

Sufficient to cover 1,600 sq. ft.

ZINC

Sufficient sheet zinc to cover 168 sq. ft.

FINISHING BOARDS

- 12 boards, $\frac{3}{4}$ by 6 in., 10 ft. long, S-4-S.
- 8 boards, $\frac{3}{4}$ by 12 in., 12 ft. long, S-4-S.
- 2 boards, $\frac{3}{4}$ by 12 in., 14 ft. long, S-4-S.
- 12 boards, $\frac{3}{4}$ by 4 in., 12 ft. long, S-4-S.
- 2 boards, $\frac{3}{4}$ by 4 in., 14 ft. long, S-4-S.

WINDOWS AND DOORS

- 2 window frames and sash to fit.
- 1 door frame and door to fit.

FLOOR STRIPS

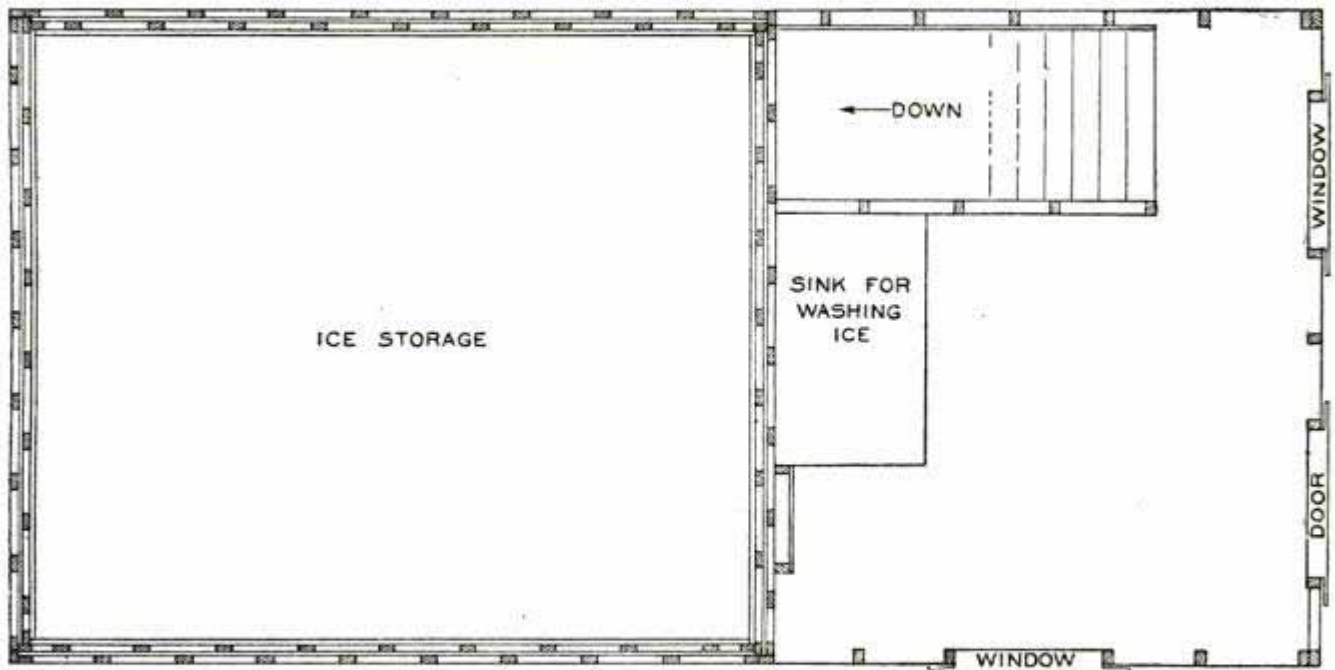
- 72 strips, $\frac{3}{8}$ by 1 in., 14 ft. long.

ICE HOIST

- 1 chain hoist and traveler or bay-fork traveler.

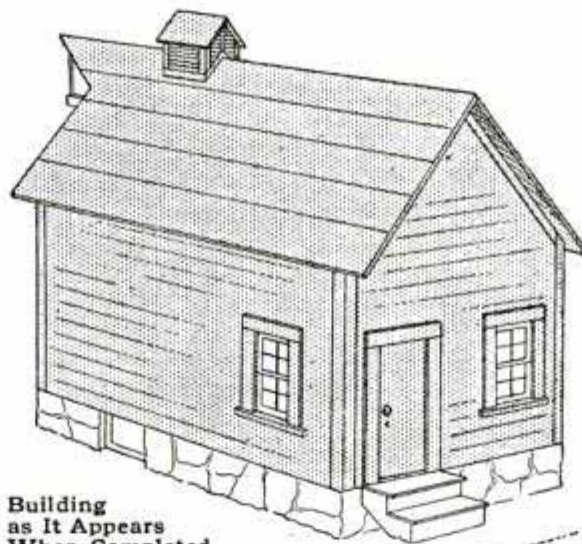
FOUNDATION-WALL MATERIAL

- 100 bags of cement.
- 10 cu. yd. of sand.
- 20 cu. yd. of aggregate.
- The aggregate should have all the dust screened out and no stones larger than 1 in.



Floor Plan of a Building in Which a Small Entrance Room is Provided for a Stairway, Washing Sink and Refrigerator or Dairy Utensils, in Connection with the Ice-Storage Room

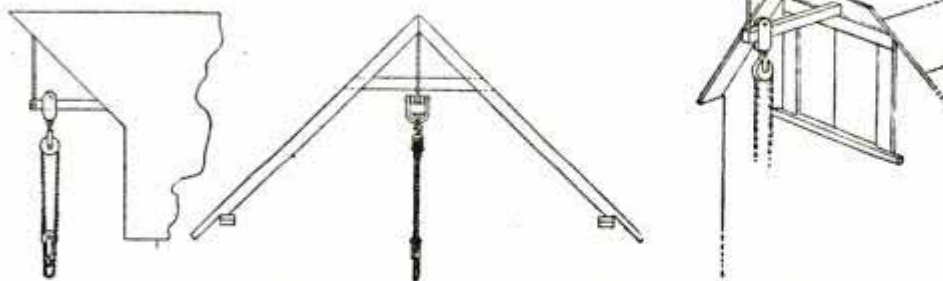
through the foundation wall, at the bottom of the stairway, should be made double and fit closely in its frame. If there is not room enough at the bottom of the stairway for a landing before entering the storage room, a latch can be made so that the person entering can open the door before the bottom of



Building as It Appears When Completed

to the top of the door within easy reach of a person standing two or three steps above the bottom.

The small room may be arranged to suit the builder. The stairway is so placed that a window lights it to the bottom. An ice-washing sink is placed in the center and against the partition between the rooms. The sink is simply a table, about 3 ft. high, 4½ ft. long and 3 ft. wide. The sides of the table are built up about 4 in. high, and the inclosure lined with heavy zinc, soldered at the joints, and a drain connected so that



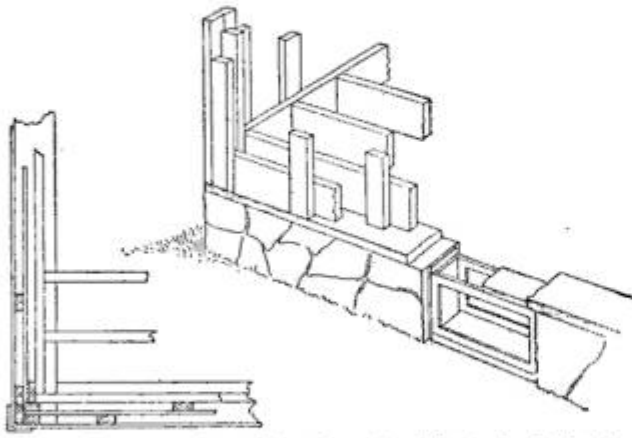
Detail of the Hoist and Traveler on the Track, Also the End of the Building Where It Projects over the Track End

the stair is reached. This can be accomplished by levers, or by means of a chain-actuated latch with a handle or knob fastened



Each Joist is Built up So That the Floor Slopes toward the Center of the Room Where a Drain is Provided to Take Care of the Drippings

the whole table forms a sink in which the ice cakes taken from the storage can be washed before taking them to the refrigerator or elsewhere for use in other ways. The drain should be



Corner Construction Showing the Method of Setting the Studs Flatways to Form a Triple Wall

provided with a fine screen covering, to prevent stoppage from sawdust particles.

A ladder is provided on both sides of the partition, which is only built up to the plate at the lower end of the rafters, for use in entering the ice-storage room. The ice is taken from the room with the chain hoist in the same manner as when storing it. The cakes are hoisted above the partition and then the traveler on the track is pushed along over the sink where the ice is lowered and washed in the sink.

In constructing this house, it must be taken into consideration that the cold-storage room will cause the ice to melt much quicker and, therefore, its size is such as to provide for this extra refrigeration; but this is no waste, for it must be borne in mind that this refrigeration keeps edibles at a lower

temperature and less ice is required in the kitchen refrigerator for the things being made ready to serve. Such a room will keep a quarter of a beef or a whole pig, and all kinds of perishable articles can be kept through summer and winter. The chilling of the room takes place automatically.

When placing the cakes of ice in the storage room, be sure to have them cut squarely so that they will fit closely together. They are placed on the 2 by 4-in. pieces of the floor, without any sawdust or insulation of any kind, the sides being the only place where the sawdust is used, when a cold-storage room is below. If there is no cold-storage room below, then place a layer of sawdust on the bottom and build up the ice cakes upon it. A small space—about 4 in.—is left at the sides and ends of the room, and this is kept filled with sawdust tightly packed as the layers of ice blocks are built up within the storage room. When the room is filled with ice, the top is covered with sawdust at least 1 ft. thick, and it is also well to place some hay loosely on top of the sawdust. This latter will take care of any moisture that rises from the ice, and is, in its turn, dried out by the air currents which pass out through the ventilator at the ridge of the roof.

Before filling the room each year, any left-over ice should be taken out, the room thoroughly aired and cleaned, and the sawdust laid out on a cloth or boards to be dried out and aired. If these simple rules are observed, the house will be kept in good condition and will last for years.

Antidotes for Poisons

The following is a good and effective set of antidotes to use when a person is accidentally poisoned. The first thing to do is, of course, to send for a physician, but while waiting for him induce vomiting by tickling the throat with the finger.

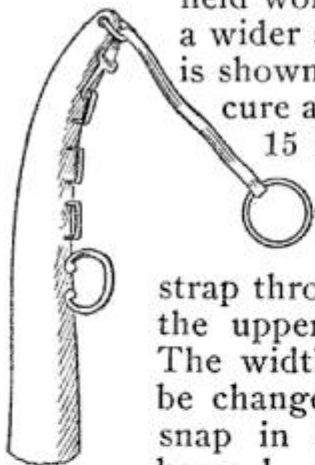
For specific poisons the following are recommended as best first aids, and as a general rule it should be remem-

bered that acids are antidotes for alkalis, and vice versa. For muriatic, oxalic, acetic, sulphuric and nitric acids give drinks of soapsuds, magnesia solutions, or lime water. For prussic acid give ammonia in water and dash cold water in the face. For carbolic acid give whiskey or alcohol freely, flour and water, mucilage, Epsom or Glauber's salts in water. For potash,

lye, hartshorn or ammonia give vinegar or lemon juice in water. For arsenic, rat poison or Paris green give milk, raw eggs, sweet oil, lime water or flour and water. For bug poisons, lead, saltpeter, corrosive sublimate, sugar of lead or blue vitriol give whites of eggs or milk in very large doses. For chloroform, chloral or ether give dashes of cold water on the head and chest, and produce artificial respiration. For carbonate of soda, copperas or cobalt give soapsuds and mucilaginous drinks. For iodine, antimony or tartar emetic give starch and water, astringent infusions or strong tea. For mercury and its salts give drinks of mucilage, milk or whites of eggs. For opium, morphine, laudanum, paregoric, soothing powders or syrups give strong coffee, hot baths and keep the patient awake and moving at any cost.—Contributed by Loren Ward, Des Moines, Iowa.

A Line Spreader

A convenient way to attach a line spreader to a hame, for shifting from field work to work requiring a wider spread of the horses, is shown in the sketch. Procure a strap 1 in. wide and 15 in. long and attach a ring to one end and a snap at the other. Run the strap through the top loop in the upper end of the hame. The width of the spread can be changed by attaching the snap in some of the other hame loops.—Contributed by G. H. Holter, Jasper, Minn.

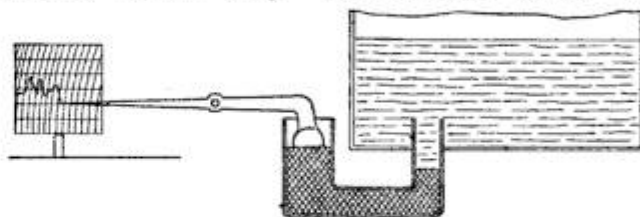


Homemade Registering Gauge for Liquids

This gauge, which is described by a correspondent of a French magazine, possesses the advantage of being simple, strong, easily made, much cheaper than manufactured gauges and giving as exact results.

The collecting tank for the liquid is

provided at the bottom with a U-tube, one branch of which is rather wide and this is partly filled with mercury. Each time any additional fluid is

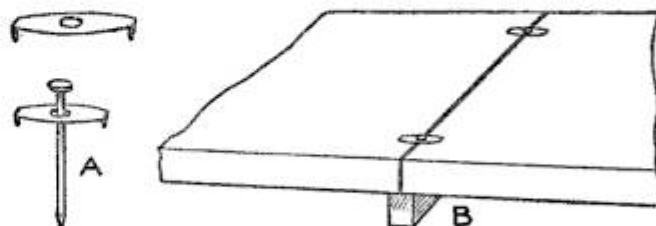


The Weight of the Fluid Causes the Arm to Move in Relation to Its Depth

poured into the tank, the mercury column in the outer branch of the tube rises, but of course less than the increased height of the liquid in the tank; the relation between these heights being inversely that of the specific gravities of the mercury and the fluid. Now by placing a float in the mercury which acts upon a lever, fulcrumed at such a point that its two ends are in length proportional to the specific gravities of mercury and the liquid to be measured, the height of the liquid within the tank is recorded by the pen point at the outer end of the longer arm on the drum, which is rotated by clockwork, and thus the amount of liquid is easily computed. The paper on which the record is made must be calibrated to zero when the tank is empty.

To Hold the Ends of Boards on a Small Strip

On some work it is very difficult to nail the ends of boards securely on a small or narrow strip, as the nail is liable to split the wood. If an ordinary nail is equipped with a small piece of metal, as shown in A of the

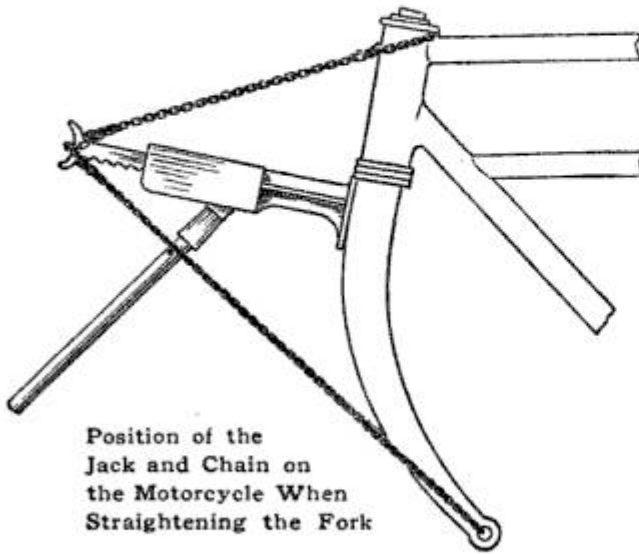


The Metal Clip Allows the Nail to be Driven in the Center of the Strip between the Board Ends

sketch, it can be driven between the ends of the boards into the strip and the pointed metal will overlap and hold the boards.

Straightening a Motorcycle Fork

A motorcycle having a sprung fork was brought to my shop, and as it had to be repaired quickly I set about to



Position of the Jack and Chain on the Motorcycle When Straightening the Fork

straighten the fork with the use of an automobile jack. The jack was set on the fork and a chain attached as shown in the sketch. It was only necessary to work the jack out until the fork was straight.—Contributed by J. N. Bagley, Superior, Neb.

Laying out Sections for a Hollow Metal Ball

Draw a circle, Fig. 1, the diameter of the ball and divide the circumference into any even number of spaces,

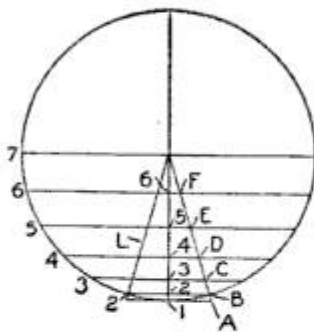


FIG. 1

The Circle with Division Lines and the Stretchout Used to Make the Pattern for a Section

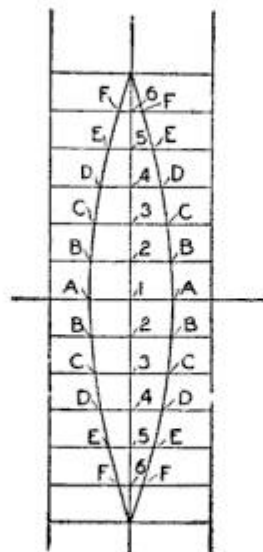


FIG. 2

the more the better, as at 1, 2, 3, 4, 5, 6, 7, and so on. The circle shown would have 24 spaces on its entire cir-

cumference. Then draw parallel lines at the division marks across one-half of the circle as shown, and a center line at right angles to the division lines. Two lines, L and A F, are next drawn from the center of the circle to those points on the circumference that mark the first horizontal line, or to 2 and B, these lines being then extended until they cross a line drawn tangentially to the circle at point 1.

Draw three parallel lines for the stretchout, Fig. 2, one center line and two outside lines, the latter being far enough apart to make one section. Space off evenly on the outside lines 12 divisions the same width as those on the circumference of the circle, and join the divisions with parallel lines as shown. These lines are marked 2, 3, 4, 5 and 6 above and below the middle line 1. Now mark off on line 1 and on either side of the center line, two points, AA, the same distance from the center line as the length of line 1A in Fig. 1. Next the length of line 2B, Fig. 1, is set off on lines 2, Fig. 2, in the same manner, and so on, until points FF are marked on lines 6. Join the points from A to F, above and below the line 1, and on each side of the center line, with a curved line, and by finally joining the points FF with the points where the center line intersects the unnumbered lines at top and bottom of stretchout, as shown, a pattern for one section of the ball will be outlined. There are 24 divisions on the circumference of the circle, but only 12 sections cut as shown will be required to complete the ball.—Contributed by S. C. Shipman, St. Petersburg, Florida.

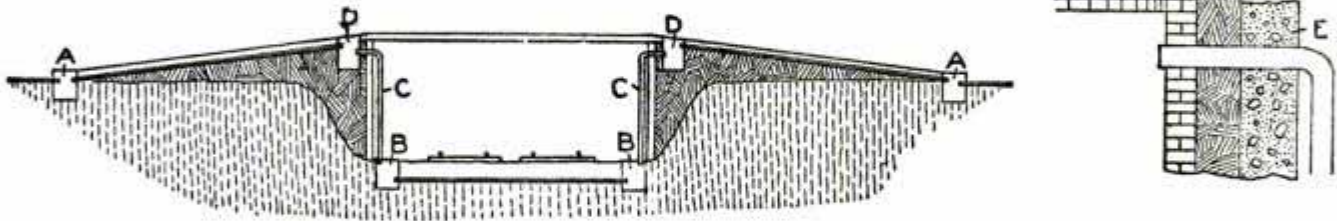
An Unusual Conduit Crossing

While on a power-conduit job through the heart of one of the finest residential sections of a city we were brought to a halt by a viaduct, a series of which had been but recently completed by a trunk railroad and a city belt line tracks. The manner of crossing the viaduct, finally adopted by the engineers of the city, railroad and

power company, is shown in the illustration.

The work was accomplished under rather trying circumstances, the trains running very frequently at this point, and the entire trench having to be cut

as it does when present in wood. This may be avoided by painting the surface of the concrete with white vitriol, chemically known as zinc sulphate. It is inexpensive and may be purchased at any drug store. Use a 10-per-cent



The Location of the Manholes and the Line of the Conduits, and the Manner of Inserting the Pipes through the Abutment Walls and into the Manholes

through rock by hand, as it could not be blasted out on account of disturbing the tracks. The weather conditions also increased the difficulties, as it was zero weather and very windy.

Two manholes, AA, were first constructed at the foot of the approach and tile runs of ten ducts in two units, one 6-way and one 4-way, were put in to the top of the guard on both sides of the open cut. Manholes, BB, were then built on each side of the tracks at the foot of the abutments, and iron pipes, CC, ten in number, were run from the manholes DD at the top of the grade to those beside the tracks. To accomplish this, holes, E, as shown in the cross-section sketch, were drilled through the retaining walls, and each pipe placed in position against the walls and held by clamps. Expanded metal was then used to cover all of the pipes and this, in its turn, was covered with a plaster coat of concrete, which made a neat, symmetrical job and covered the pipes completely. With the laying of the connecting pipes under the tracks, the job was completed.—Contributed by Geo. M. Petersen, Buffalo, New York.

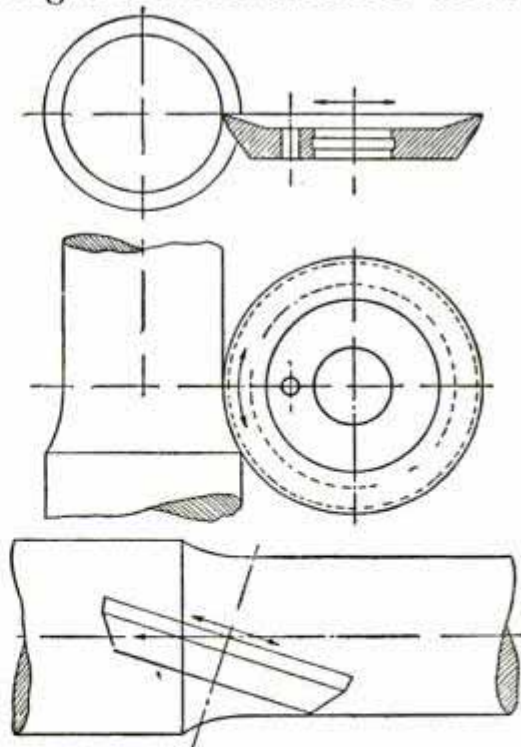
Painting Concrete

Much difficulty is usually experienced in painting concrete. The alkali acts on the linseed oil chemically and destroys it, while the moisture coming out causes blistering and peeling, just

solution, that is, one made of 10 parts of zinc sulphate and 90 parts of water. Apply this solution with a brush and let it dry, after which paint will adhere readily and will not come off.

Rotary Cutting Tool for a Wood-Turning Lathe

A rotary tool for cutting wood in a turning lathe is the invention of a Frenchman. It consists of a disk having the cross section of an ordinary cutting tool and is mounted on a spin-



The Cutting Edge of the Tool is on the Periphery of the Steel Disk

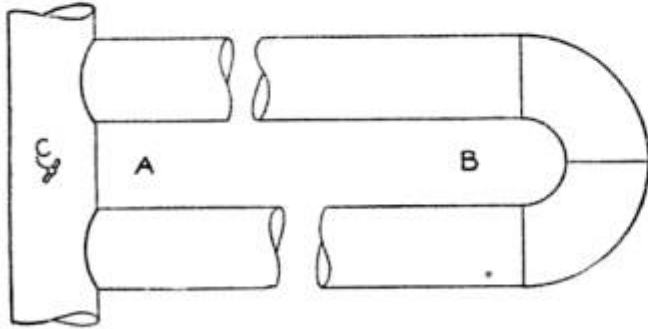
dle which is driven by a proper connection to the lathe gears.

The claim is that, as the cutting

point of this rotary tool is constantly changing, it will not become unduly heated, and much greater working speed can be attained; also that the turned surface will be much smoother than if an ordinary tool were used.

Radiating Bend in a Stovepipe

When a stove is employed for heating purposes a very good way to save about one-third of the fuel is to place

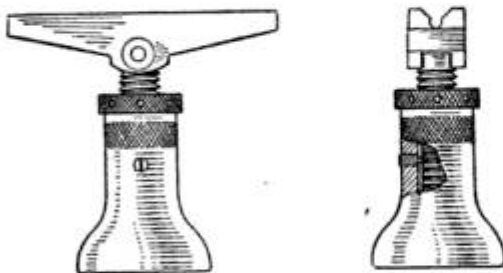


The Heat from the Escaping Gases may be Utilized by Turning Them into the Radiating Bend

a heat-radiating bend in the stovepipe. This consists of two joints having tee connections placed in the pipe A and two or more joints joined in a U-shaped piece, B, with two elbows. A damper placed in the pipe at C directs the escaping gases either into the chimney or into the radiator. The damper placed in the pipe is left open only when starting a fire. In this manner heat is used that would otherwise be wasted.

Center Rest for Long Milling-Machine Work

An improvement over the ordinary form of center rest used to support long slender work when milling be-



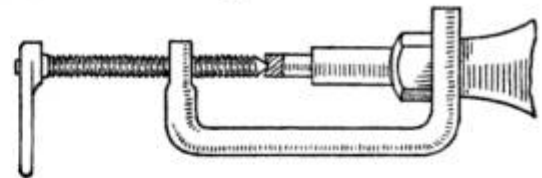
An Adjustable Center Rest, Having a Long Bearing Surface to Place against the Work

tween centers, is shown in the accompanying illustration. In the ordinary rest the top of the screw has a diam-

eter of about $\frac{3}{4}$ in. and provides the only surface on which the work can be supported. In the rest illustrated, on the other hand, the screw carries a hinged member at the top which, when brought up into contact with the under side of the work, offers a bearing for a much greater length than the old style, permitting less spring, and allowing heavier cuts and faster feeds. The expense of changing a regular rest to the form shown is slight compared with the advantages gained.—Contributed by Chas. F. Scribner, Hartford, Connecticut.

Temporary Repair on a Valve

The accompanying sketch shows how a correspondent of Power repaired a disabled valve so that it could do temporary service. The thread in the valve stem would not hold the valve disk to its seat. A $\frac{5}{8}$ -in. rod was bent as shown in the sketch, one end sawed for half of its length and the parts spread wide enough apart to fit over the valve bonnet, back of the stuffing nut. The valve wheel was removed and the point of the threaded



Pressure Clamp Used to Seat a Valve Where the Threads on the Stem were Worn Off

screw was seated in the end of the valve stem. As the screw fitted in a tapped hole in the outer end of the clamp, the valve could be closed at any pressure by turning the screw, and the pump pressure would open the valve when the screw was backed out.

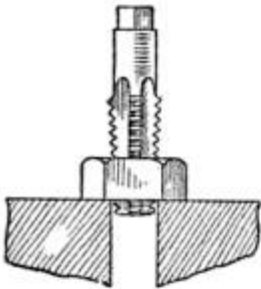
Repairing a Leak in a Water Jacket

When the water jacket of a motor cylinder is cracked, it is not always convenient to take the engine down for brazing or welding. If the owner does not object to a patch, the jacket may be repaired as follows: Cut two strips of packing from sheet asbestos, large enough to extend almost $\frac{1}{2}$ in. from

the crack in all directions. Soak one piece in white lead and oil for a couple of hours. Apply this strip to the outside of the jacket, cover it with the other piece and lay a piece of stove-pipe iron, the same size or a trifle larger than the packing, over both. Wire this on the cylinder, and a patch is secured that will hold indefinitely. Where the thickness of the walls or of the adjacent parts are sufficient, two small bands of iron can be fitted over the patch and held with screws turned into the jacket metal. When painted the patch will be as neat as any repair of that kind.—Contributed by Donald A. Hampson, Middletown, N. Y.

Starting a Tap True with the Work

A good method of starting a tap so that it will cut the thread square with the surface of the work, is to use a guide nut. A nut that fits the tap and has the same number of threads per inch, is faced in a lathe on a mandrel to make the surface perfectly perpendicular to the thread. The nut can then be run up on the starting tap a little beyond the first thread and when pressed to the surface of the work, it will guide the tap straight into the hole drilled for it in the piece of work.



Wagon-Tire Fasteners

Where it is desired to fasten a tire without resetting it, the method shown in the sketch is quite effective. Pieces are cut from sheet metal, as shown in Fig. 1, and slipped between the tire



FIG. 1

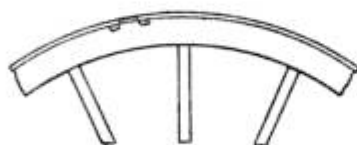


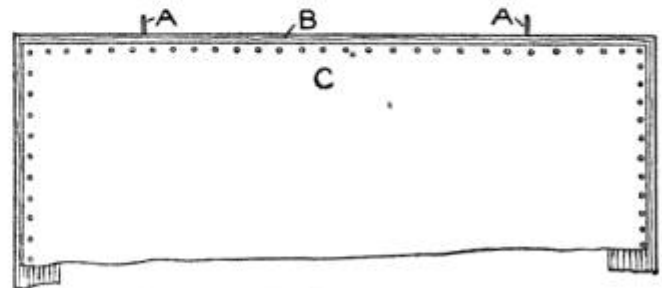
FIG. 2

Shape of the Metal Clip and How It is Placed on a Tire and felloe, the tire occupying the space shown between the dotted lines. The

long center part on each edge is turned up on the tire, and the short ends, on the felloe, as shown in Fig. 2. As many of these clips are placed on the tire as are necessary to hold it.—Contributed by Irl R. Hicks, Hallsville, Mo.

Protecting Windows While Painting

When spraying buildings with paint or whitewash, a very good way to keep the liquid from splashing the windows

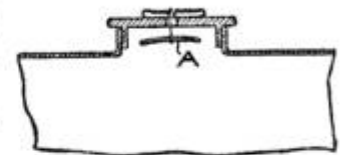


A Frame Covered with Roofing Paper to be Hung in Front of a Door or Window

and doors is to make a frame B, cover it with roofing paper, C, turn two screwhooks, AA, into the top piece of the frame and hang the cover thus made on the window or door casing. The cover is easily applied and taken away.

Valve for a Gasoline-Tank Vent

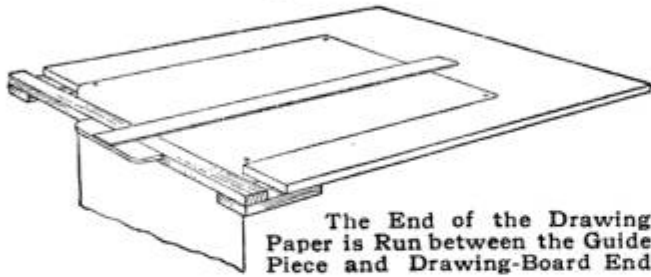
It is dangerous as well as annoying to have gasoline splashing from the air vent in the cap of an automobile or motorcycle gasoline tank. Some users stop up the hole and then have carburetor troubles. The best way is to make a valve, A, of a small disk of leather and fasten it to the vent hole with a strong thread. The thread is run through the hole and knotted. This valve will prevent the gasoline from escaping, yet provides a way to admit air to the tank.—Contributed by Aden K. Runkle, Kinsman, O.



ⓄThe silver dime is 10 per cent alloy, and its weight is 38½ grains. This amount of silver melted and fused with 10 ordinary brass pins makes a good silver solder.

Drawing Board for Long Drawings

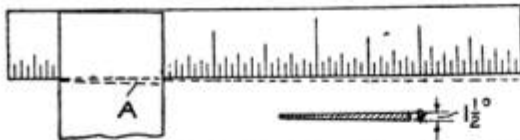
The illustration represents a drawing board which can be used for making drawings of any length. The at-



tachment was devised by a correspondent of the American Machinist. The opening between the board and the T-square rest enables the draftsman to draw the paper through as shown, so that the drawing may be made of any desired length.

Square Attachment to Determine Die-Clearance Surfaces

In filing the clearance in dies, all cutting surfaces may be accurately determined by using the attachment shown in the sketch on a square. It is made of a piece of metal as long as the post



The Slope of the Blade Produced by the Wedge is Just Right to Test the Die Edges

of the square is wide and filed to an angle of $1\frac{1}{2}$ deg., then fitted to the slot A in the post of the square. The wedge thus formed is used beneath the edge of the square blade to give it the proper slope for testing the edge of the die.—Contributed by J. F. Tholl, Detroit, Mich.

Wire Joints Soldered with Heat from a Motorcycle Engine

The "telephone trouble shooter" who rides a motorcycle can make use of a hot engine for heating a soldering iron. When copper wires are to be soldered before placing them on a pole or in a box, lay the joint on the hot cylinder until it melts the solder.

Fuses and telephone transmitters can be repaired in this manner. I have many times lighted my alcohol torch with a spark from the spark coil by touching it to the frame of the motorcycle.—Contributed by C. F. Higby, Redlands, Cal.

Cutting Circles without a Compass Saw

The slip of a compass saw often spoils a circular cut, but if lines are sawn at a tangent to the circle, Fig. 1, and the remaining projections, Fig. 2, rasped off, a good circle will be the result.

If a tapering piece (Fig. 3) is to be

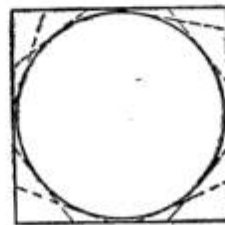


FIG. 1



FIG. 2



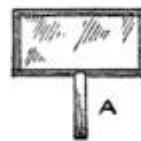
FIG. 3

Lines are Sawn Tangent to the Circumference and the Remaining Projections Rasped to a Circle

cut, find the centers of both sides of the board, lay out the circles, then cut and rasp into shape. The more cuts that are made with the saw the less rasping will be required.—Contributed by Jos. M. Kane, Doylestown, Pennsylvania.

Eye Shield for Gun Sighting

A little shield that will greatly assist hunters in shooting against a strong wind can be made of a small piece of mica or celluloid mounted in a frame as shown at A, the device being attached to the gun stock with a support, as shown at B. The shield



The Transparent Shield is Placed on the Gun Stock Just in Line with the Sights

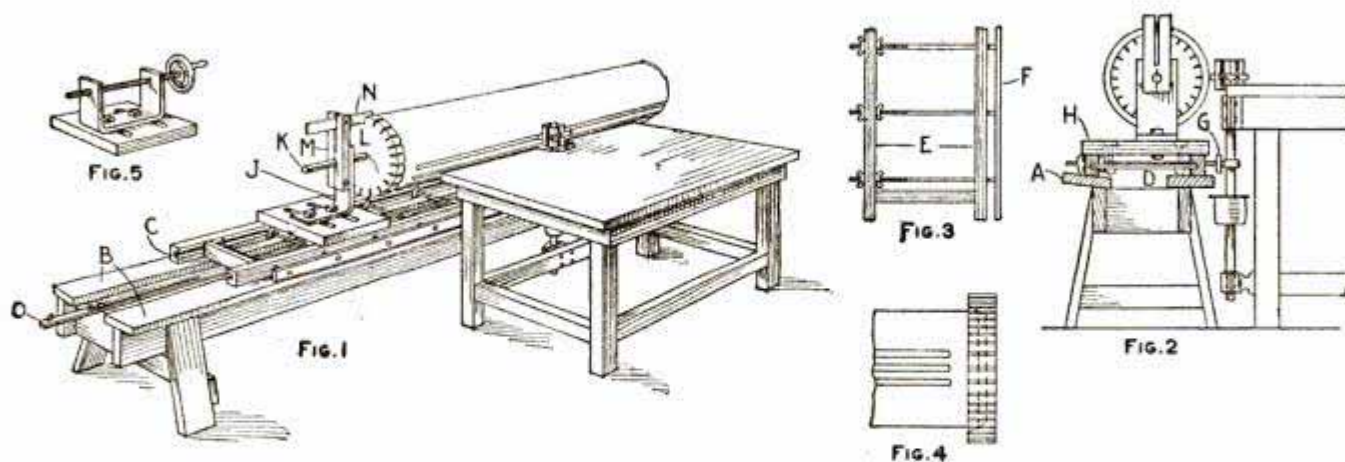
should be set on the gun stock so that it will be just in front of the eye when the gun is held in position ready for firing.

How to Make a Fluting Machine for Small Columns

The owner of a small shop, sometimes having orders for small fluted columns, can make a machine for the purpose of parts found about most shops. The cutter head used for such a machine can be taken from a molder or matcher. In constructing our machine we used the side head from a matcher that had been discarded. The head was complete with yoke, boxes, etc., and only needed to be fastened to a frame or table about 2 or 3 ft. square, which had a top made of birch strips glued together and dressed off true. The spindle was placed at one side, with the lower edge of the head $\frac{1}{4}$ in. below the surface of the table top. The table makes a very good shaper for working small lots of molding for pilasters, bases and caps.

The frame for supporting the carriage which holds the column, while being fluted, is made, as shown in Fig. 1, of 2 by 8-in. material, framed and bolted together, with legs and braces, and should be twice as long as the longest column to be worked. The top pieces, $1\frac{3}{4}$ by 6 in., should be of oak or cypress and must be jointed straight from one end to the other, as this makes a runway for the carriage. The outside piece A, Fig. 2, should have the outside edge raised $\frac{1}{4}$ in., so

ered table on the spindle side and far enough away to clear the pulley and belt driving the spindle. On the top pieces of the supporting frame, B, Fig. 1, the carriage is placed for holding the column. This carriage should be as long between the heads as the longest column to be fluted, and is constructed of pieces of $1\frac{3}{4}$ by $2\frac{1}{2}$ -in. oak, perfectly straight and framed edge-wise with crosspieces and bolted, to make it rigid. The side pieces have a $\frac{5}{8}$ -in. slot, $\frac{1}{2}$ in. deep, running on the inside $\frac{3}{4}$ in. from the top edge for their full length, as shown at C, Fig. 1. These slots are for engaging the crosspiece of iron D, Fig. 2, which fastens the heads to the carriage. In the side pieces of the carriage E, Fig. 3, holes are bored every 12 in. to receive $\frac{3}{8}$ -in. iron rods threaded, 6 in. on one end, for two thumbnuts and arranged as shown. These $\frac{3}{8}$ -in. rods are fastened on their other end to a piece of $\frac{1}{4}$ by 2-in. flat iron placed on the outside of the carriage and running its full length, as shown by F, Fig. 3. The thumbnuts are used to adjust the guide bar to the slope of the column, and as the carriage is pushed along on the cutter head, the guide bar F, Fig. 3, presses against an adjustable stud G, Fig. 2, opposite the center of the



An Inexpensive Column-Fluting Machine Which can be Made of Discarded Parts That Usually are Found About Any Small Shop. The Parts are Not Dimensioned and can be Made in Sizes to Suit Conditions

that the carriage will tend to slide toward the head as the column is being fluted.

The frame is bolted to the birch-cov-

cutter head. By moving the stud in or out, the depth of the cut can be regulated without changing all the thumbnuts on the guide bar.

The head for swinging the column is placed on the carriage and fastened with bolts, passing through the piece H, Fig. 2, and into the iron bar D, which engages in the slot C, Fig. 1, on the inside of the carriage frame, making the head adjustable for different lengths of columns. On this piece is an iron upright, shaped as shown in J, Fig. 1, which is adjustable across the carriage by slots, to accommodate different diameters of columns. The upright J has a center pivot, K, to center the fluting head L on the end of the column, and also an adjuster, M, which is friction-tight on the pivot-point shaft and moves over or back, to bring the proper place in the stave of the column to the center of the cutter head. This can also be accomplished by so constructing the head that it can be raised or lowered on the spindle.

On the upper end of the adjuster is placed a spacer latch, N, Fig. 1, which engages in slots in the fluter head or column. This latch is adjustable to raise or lower it for different diameters of columns. The spacing head, for regulating the number of flutes, is turned in a lathe to get it true, and, to make it self-centering, is shaped, as shown in Fig. 4, with a tapered recess turned out on the inside to fit over the end of the column. It is very important that the column be centered so as to make the ribs or fillets between the flutes the same width.

The heads are laid out accurately by stepping the spaces with a divider on their outer edge, and cutting the notches with a hand saw to fit the end of the latch N. These heads are divided for numbers of flutes in the column, which should be 24 for the Ionic order, 20 for Doric, and 22 for Corinthian.

This machine will prove superior to others for the reason that it will protect the sharp edge or arris at the meeting of the flutes of the Doric order, because there is nothing to rub or mar them as on the shaper or jointer. Thus the shape of the column can be kept better, as everything is open so

that the operator can see the depth of the cut the machine is making.

The number of cones or neckmolds on a column do not interfere with fluting on this machine, as the column swings clear. The rear head, Fig. 5, is fastened to the carriage in the same manner as that described for the head for the end. It is a self-centering head for the end of the column, is also adjustable across the carriage, and has a threaded tail screw to facilitate the handling of the column.

To regulate the length of the flute, for starting and stopping the carriage, a slotted stop, O, is placed on each end of the frame, between the pieces B. The cutter head should be as small as possible and should be of the solid-cutter type, which is sharpened only on the face. However, the square-slotted head with knives will do, although it would require a number of different thicknesses of solid cutters to make the different widths and styles of flutes on columns ranging from 4 to 14 in. in diameter.—Contributed by Chas. M. Allen, Knoxville, Tenn.

Cutting the Rust from Bolt Threads

If the threads on a bolt or nut are covered with rust, or fit tightly, clean them out with a mixture made as follows: Mix some powdered emery with any kind of grease and smear the threaded parts both inside of the nut and on the bolt, then turn the nut on the bolt and run it back and forth over the threads. This method will be found effective even in the most stubborn cases.—Contributed by G. N. Beebe, Benning, D. C.

Brace Chuck Used as a Small Vise

While out on a job I had to cut off a number of screws, and having no vise to hold them, I put them separately into the chuck of a carpenter's brace, which held them securely while they were cut to the desired length with a file.—Contributed by H. C. Heidt, Chicago, Ill.

Air-Cooled Commutator Brushes

The ordinary commutator brushes, made of carbon-graphite or a mixture thereof with metal powder, are able to carry but a very small current or else become heated too quickly, and to cool them with an air blast is impractical because the material has only a low conductivity of heat, so that they do not get cooled fast enough. To overcome this trouble, a German concern has brought on the market slotted brushes as shown, which, it is said, through the greatly increased surface

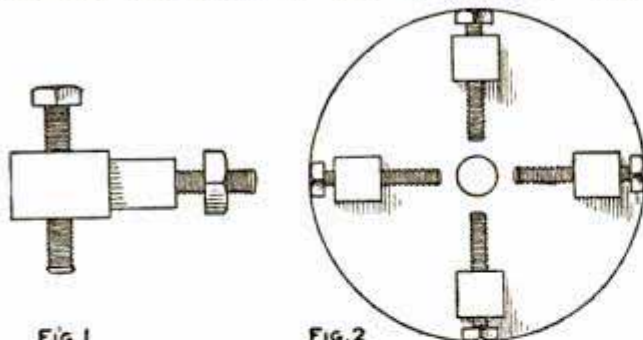


The Slots in the Carbon-Graphite Brush Tend to Cool the Brush as the Commutator is Rapidly Revolving

on which the air acts are efficiently cooled by the air current created by the revolutions of the commutator.

An Emergency Four-Jawed Chuck Made of a Faceplate

Four parts are made as shown in Fig. 1, their size depending on the size of the faceplate where they are to be used. The shank should be a close fit for the slots in the faceplate. The



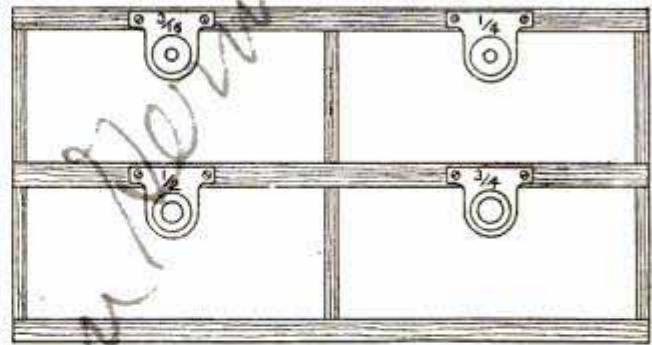
The Makeshift Jaws are Placed in Four Slots of the Faceplate to Form a Chuck

manner of using them on a faceplate is shown in Fig. 2.—Contributed by Fred Dowle, Springfield, Mass.

Storage-Bin Marker Plate for Twist Drills

The usual tool-room storage bin is equipped with compartments marked with a plate which carries a hardened steel bushing of the proper diameter

in addition to having the size stamped upon it. Before the keeper hands out



The Marker Plate and Sized Holes Designate the Size of the Drills in Each Compartment

a drill it is tried in the bushing, thus eliminating any mistakes in sizes. The drill is also tried in the bushing when it is returned to the bin.

A Battery Charged in a Hurry

A storage battery can be safely charged in the shortest time possible by using a heavy current at the beginning and reducing the strength as it fills, says Motor World. The last half of the charging should never be done at a high rate, and near the end the charging must be slow to prevent injury to the plates.

Connecting Ends for Coil Springs

It is difficult to shape the ends of a coil spring made of 1/4-in. wire into convenient forms, such as loops or eyes, for connection to other parts, and if the spring is made of 3/8 or 1/2-in. wire, it is impossible. For such springs make a threaded piece to fit into the ends of the spring, the pitch of the thread, which should be semi-circular in cross section, being the same as that of the spring. One of these pieces is shown at A and is screwed into the end of the spring, as shown at B, then fitted with an eyebolt. If the piece A is made a good

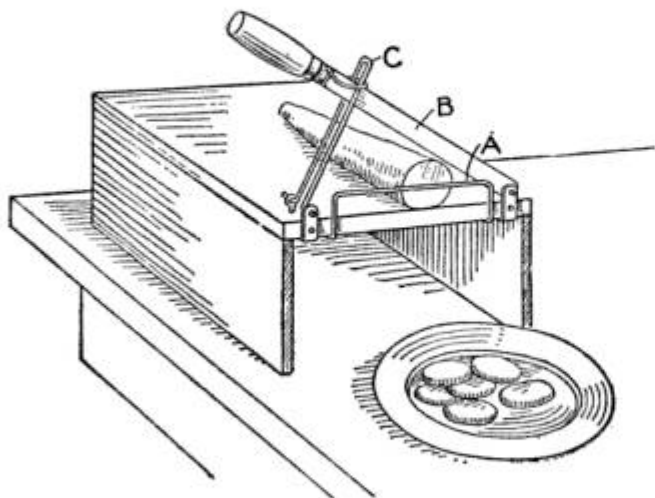


The Expanding Spring Tends to Close the Coils, Thus Gripping the End Piece Tightly

fit, it will never loosen, as, in expanding, the spring only gets a firmer grip on it.

A Vegetable Slicer

A practical little device for cutting vegetables into slices of uniform thickness, which can be easily made at

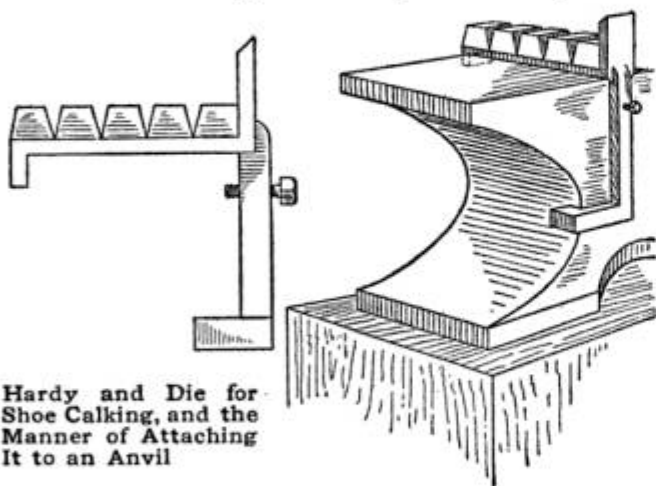


The Guide may be Set to Cut a Slice of Any Thickness

home, is shown in the illustration. It is made of a box of suitable size with one end open. A U-shaped wire, A, bent up at its closed end, is attached to the under side of the top on the box so that it can be adjusted for various thicknesses of slices. The cutting knife B is pivoted at the end of the blade, which runs through a double guide wire, C, which is held closely to the handle with a loop as shown, to make the knife blade cut squarely through the vegetable.

An Anvil Calking Tool

The hardy and die shown in the sketch was originated by a correspond-



Hardy and Die for Shoe Calking, and the Manner of Attaching It to an Anvil

ent of the Blacksmith and Wheelwright, for toeing and calking shoes. The shank of the tool is made of 1 by

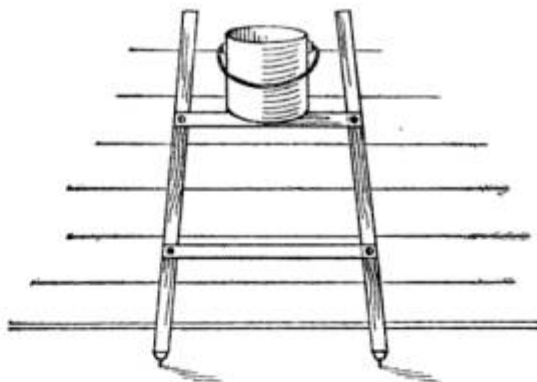
1½-in. steel and long enough to fit over the anvil as shown. The block is made of tool steel. This makes a handy tool for forming the calks on shoes.

Special Index for Magazines

Before I begin reading any journal or technical magazine, I paste a sheet of writing paper inside of the front cover like a leaf. When I find a thought, suggestion, or paragraph that interests me so that I may want to refer to it again, I pencil-mark it, then make a note of it on the leaf, giving the page number. This is much better for my particular purpose than the printed index, as it gives me just what I want and in my own words.—Contributed by D. Andrew McComb, Toledo, O.

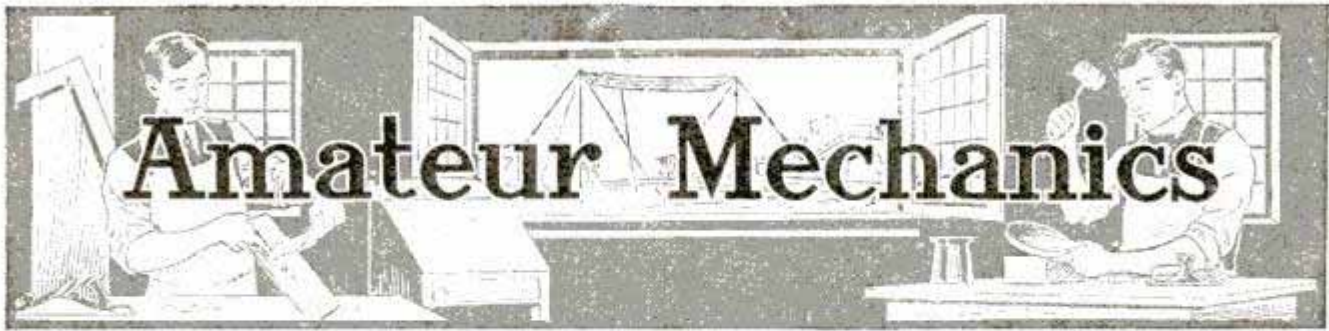
A Paint-Pot Stand

The painter working on a scaffold or side wall must stoop to dip the



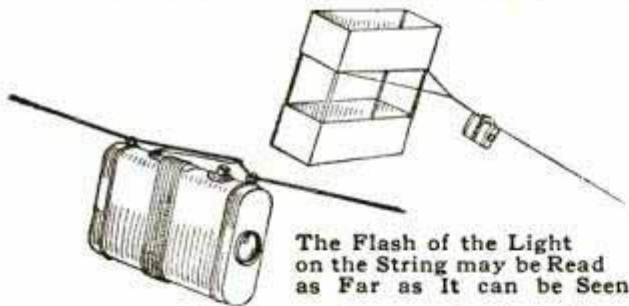
The Pot Stand can be Used When Necessary to Step Upon in Reaching High Places in Gables

brush in the paint pot. To do away with this stooping I built a pot stand of oak-barrel staves, ripped to 1½ in. in width. The crosspieces are 12 and 18 in. long, respectively. If the paint pot is large, the bottom rests on the top piece and against the wall. This stand also comes in handy many times as a stepladder to reach high places in gables. Spikes are fastened in the lower ends to keep them from slipping. When moving the scaffold up or down, the stand is hung on the guard rope or rail.—Contributed by Aug. Meyer, McCloud, Cal.



A Flash-Light Telegraph on a Kite Line

An ordinary pocket flash lamp is prepared in the following manner: A brass spring, as shown in the sketch, is bound tightly to the flash lamp with a cord, and two wires, one at each end, are twisted around the lamp's body, forming two loops at the top. The kite string is run through the loops and over the spring. The lamp is then placed near the kite. The ordinary pull on the kite string does not close the spring, but a sharp jerk will pull the string in contact with the push button and its slight pressure



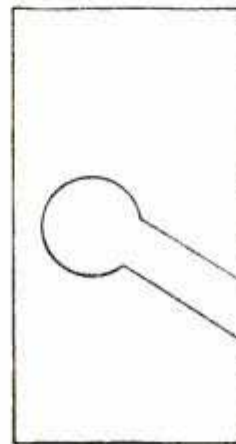
The Flash of the Light on the String may be Read as Far as It can be Seen

causes an instant flash of the light. By this method words may be spelled out in the telegraph code.—Contributed by Joe V. Romig, Allentown, Pa.

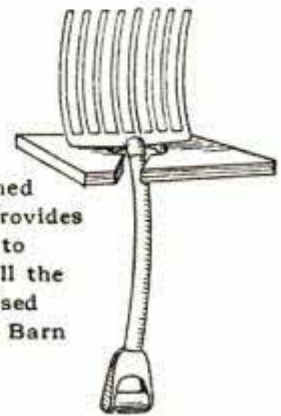
Hangers for Barn Tools

Means should be provided to have a place for all the tools used in and about a barn. The forks and shovels are usually stood up in a corner, but they can be more conveniently taken care of by making a hanger for them. The illustration shows how a hanger can be easily made and screwed to the wall of a barn. The hanger is cut from a piece of board and has a hole bored into it the size of the handle on the fork or shovel, then a notch is sawn

into the hole to pass the handle through. The board may contain one



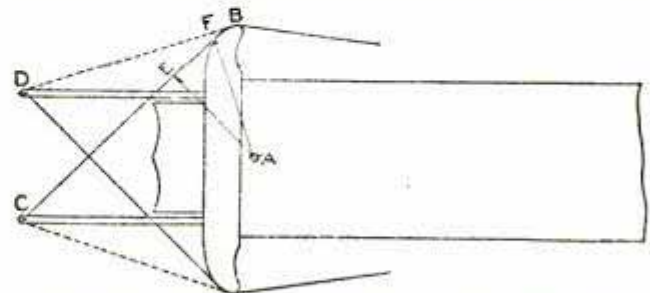
A Notched Board Provides a Way to Hang All the Tools Used about a Barn



or as many notches as there are forks and shovels to be hung on it. The implements are hung with the fork or shovel end upward.—Contributed by R. Snyder, Glidden, Ia.

Guide Ropes on a Bobsled

The sketch shows the front end of a bobsled or double runner made of a plank bolted upon two sleds. The front sled is so pivoted on the bolt A that it may be turned to steer the bob, and to accomplish this result the steersman ordinarily sits with his feet braced against the projecting ends of



The Most Efficient Way of Attaching Ropes to the Guiding Runners of a Bobsled

the crosspiece and passes the steering ropes outside of his feet, with the ropes crossed as shown. The crossing

of the ropes is supposed to add leverage, but that is quite wrong.

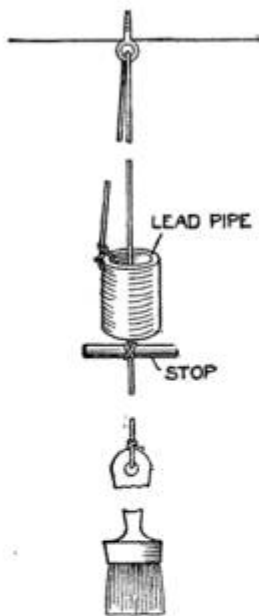
The rope, running from B to C, has a lever arm from A to E. If the ropes were not crossed, the rope would lie along the dotted line BD, whose lever arm is the distance AF, which is always greater than AE, therefore the uncrossed ropes have more leverage.

Observe what takes place when the sled is steered to the left: The distance AE decreases much more rapidly than AF, and when the crossed ropes have lost all their power, the uncrossed ropes are still useful. Many a spill has been caused by turning the sled to a position from which the crossed ropes were unable to restore it to a central position, and most of such spills would have been avoided if the ropes had not been crossed.—Contributed by R. R. Raymond, Wilmington, Del.

Brush Hanger for a Dark Room

Necessity may be the mother of invention, but it is also the grandmother of application, and application is the practical side of invention. Both the amateur and the professional photographer have been bothered by spotting and unequal development of negatives and prints in tray development, due to various causes, and sometimes by the presence of dirt particles or the unequal or incomplete flowing of the developer over the surface of the sensitive emulsion.

Most professionals and many amateurs are familiar with the use of the camel's-hair brush to avoid failures of this character, and many of them use a brush for local development in certain cases where it is necessary or desirable. Usually the brush is kept in a small glass cup, somewhere close



to various causes, and sometimes by the presence of dirt particles or the unequal or incomplete flowing of the developer over the surface of the sensitive emulsion.

Most professionals and many amateurs are familiar with the

at hand, but it is often in the way when not wanted and misplaced when most needed. The brush can be kept within reach and handy for the operator by arranging a light counterweight and pulley with a string attached to the brush, so that, normally, the brush will hang from the ceiling directly over the developing tray and can be obtained for use when desired.

The detail of this brush-string and counterweight combination was deliberately appropriated from the old plan of suspending the piece of chalk over a billiard table, so that the players could easily reach it, when needed, while, when released, it would be pulled out of the way by the counterweight. The developing brush thus suspended is always ready, never misplaced, nor in the way for other operations. This arrangement is particularly convenient where a bathroom is used as a dark room, and the shelf space is limited.

This same manner of counterweighting chalk on the billiard table may be applied to a stove-lid lifter, to keep it within easy reach and always cool enough to handle. The simplest and most inexpensive way of making this apparatus is to cut off a small piece of lead pipe for a counterweight, and, in the absence of a suitable pulley, use an ordinary screw-eye fastened in the ceiling. The latter is really better than a pulley because the string cannot run off the screw-eye. The arrangement is better understood by referring to the sketch.

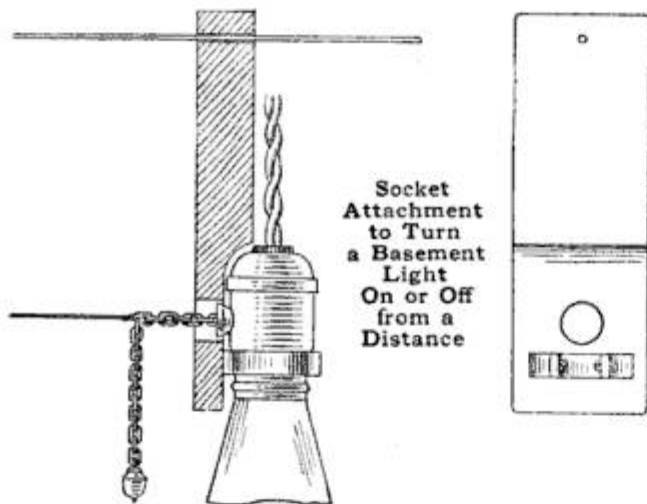
Lighting a Basement Light

There was no switch at the basement door and it was difficult to find the droplight in the dark. Instead of going to the expense of placing a switch, the contrivance illustrated and described was rigged up and proved equal to the requirements.

A $\frac{7}{8}$ -in. piece of wood was cut about 6 in. long by 2 in. wide and a recess made at one end for the socket, as shown. A $\frac{1}{8}$ -in. hole was drilled in the center, about 2 in. from one end, and

another, large enough to receive the projection from a pull socket, about 2 in. from the other end, or the end to be used as the bottom of the block. A clamp made of spring brass, as shown, was screwed securely to the board, to clamp the socket firmly. A wire was passed through the small hole and stretched across the room from the door at a height to bring the light about 6 ft. from the floor. Then the socket was clamped to the strip with the chain passed through the hole cut for it. The cord attached to the chain was run to the door casing, passed through a screweye and weighted with a nut or some light object, to keep it taut. To light the lamp or put it out only a pull on the string was necessary.

The light can be slid along on the wire from one end of the room to the



other, or can be detached from the strip when desired by unhooking the cord from the chain and taking the socket from the clamp. If more desirable, the block can be fastened permanently to some object instead of being on the wire.—Contributed by L. M. Eifel, Chicago.

Projecting Protractor Readings

A simple and efficient means of projecting protractor readings to a larger size is shown in Fig. 1. One point of the compass is placed at the center of the protractor and an elastic band is looped between the points. Then the points are spread to the ra-

dus desired, and the protractor is read where the elastic band crosses its scale. A light band should be used, and



The Extension Marks can be Easily Read on the Protractor under the Elastic Band

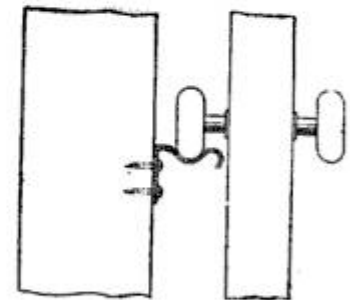
looped as shown in Fig. 2. In this way a circle of any size may be quickly divided, if a pencil mark is made each time the band comes over the proper figure.—Contributed by Thos. L. Parker, Wibaux, Mont.

Removing Grease from Paint

When removing grease from paint by using ordinary cleaners, the paint is liable to come off in the washing. A good and cheaply applied method is to rub the painted surface with a paste of ordinary whiting. This is allowed to dry and when it is rubbed off with a cloth the dirt and grease is taken away with it. The whiting is cheap and can be purchased at any drug store.

A Door Stop

A very good door stop can be easily made of a piece of metal as shown in the sketch. The metal is bent and fastened with screws to the wall against which the door swings. The extending end fits under the door knob and prevents it from striking the wall.—Contributed by C. R. Poole, Los Angeles, California.



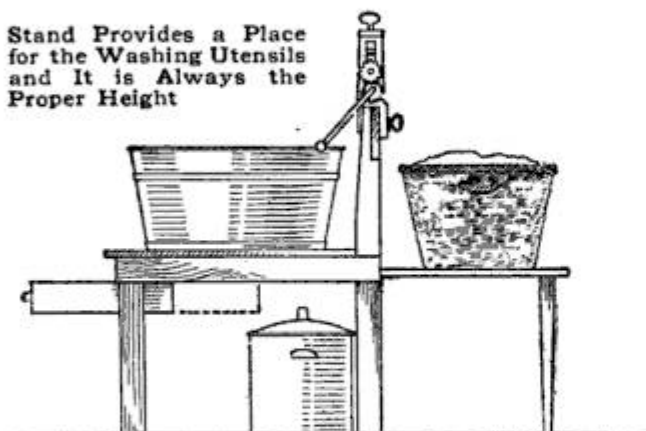
Time Indicator for Medicine Bottles

The time to give a patient the next dose of medicine can be set on the indicator, as shown in the sketch, and retained without fear of its being changed until the dose is again given. The indicator consists of a strip of paper which will reach around the bottle neck and is divided into 24 equal parts representing hours and half hours. The paper is then pasted to the bottle neck. An ordinary pin is then pushed into the cork as shown. After a dose of medicine is given to the patient the cork is replaced so that the head of the pin will indicate the time for the next dose. By this method, an accidental shifting of the indicator is almost impossible.



A Washtub Stand

Usually two old chairs or an old box makes the stand for the washtub, and these are not always the right height. A stand, like that shown in the illustration and having the proper height for the one who does the washing, can be easily made of 2 by 4-in. material and a few boards. As it is shown, the



wringer is fastened on top of the back and may remain there all the time, it being out of the way, always in its proper place, and held very firmly.

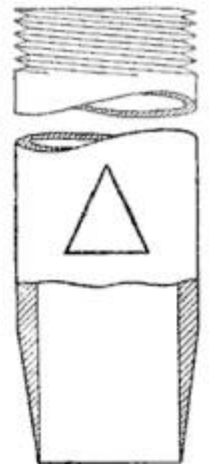
A light bracket, on which to set the

clothes basket, can be made and fastened on the back of the stand, connected with two hinges and supported by a leg hinged to the bracket, the lower end of the leg resting on the floor back of the stand.

A small drawer may also be provided in the front, in which to put away the soap and brushes, and the wash boiler can be set underneath. When one is through washing, the bracket at the back is let down, the washstand set up against the wall out of the way, and everything is then in its place, ready for the next wash day. —Contributed by Chas. Homewood, Waterloo, Ia.

Pipe Used as a Leather Punch

The sketch shows how a very cheap and serviceable leather punch can be made of an old pipe nipple. Pieces of pipe of almost any size can be found around a shop, and it is, therefore, usually possible to quickly make a punch of the required size. The cutter end can be ground very thin to prevent an over-cut, while a small slot cut a little above it will allow the removal of the leather slugs. For its purpose, this homemade tool is all that can be desired in cheapness and utility.



To Prevent Oilcloth from Cracking

A good method to prevent oilcloth from cracking, when it is used on shop tables or counters, is to first cut a paper cover for the table on which to place the oilcloth and prepare it as follows: The paper should be well oiled with common machine oil and placed smoothly on the table to be covered. The oilcloth is then smoothed out on top of the paper and stretched tightly. The oiled paper tends to keep the under side of the cloth moist, which prevents cracking. The cloth wears much longer because the paper acts as a pad.

Combination Lock for a Drawer

The principal parts of the combination lock are the five disks shown in Fig. 1. These are best made of sheet brass, about $\frac{1}{16}$ in. thick and $1\frac{1}{2}$ in. in diameter. The pins for turning the disks are each made a driving fit for a hole drilled through the metal at a point $\frac{1}{32}$ in. from the center. Notches are cut in the disks C, D and E, Fig. 1, to receive the latch end, and the disk B is made like a cam, its use being to raise the latch into its keeper when the handle is turned backward. The disk A is without a notch and has only a pin for turning the other disks.

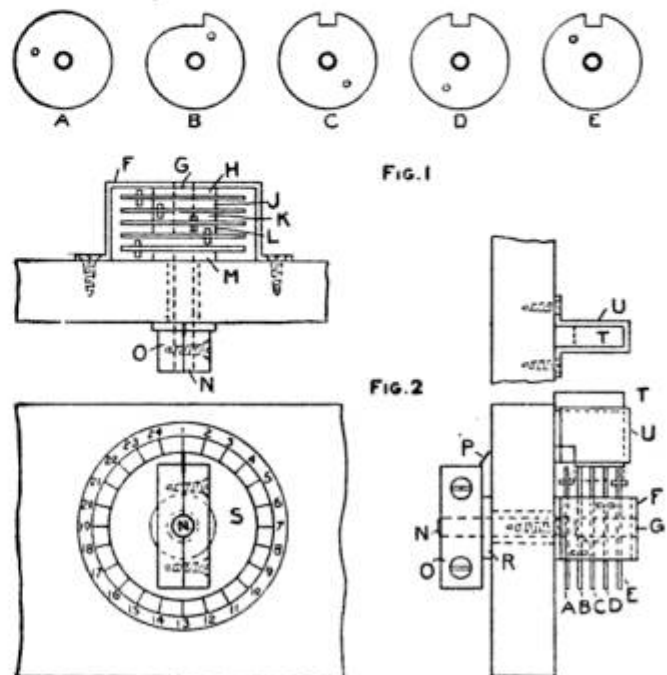
The disks are mounted on the inside of the drawer front in a U-shaped piece of metal, F, Fig. 2, which carries a $\frac{1}{4}$ -in. pin, G, as their bearing. The disks are placed on this pin with rubber washers, H, J, K, L and M, between them. These serve the purpose of preventing the disks from turning too freely. The disk A is fastened tightly to the end of the rod N, which is $\frac{1}{4}$ in. in diameter. The outer end of this rod is fitted with a handle or turning head as desired. That shown at O is made of two pieces of wood screwed together, with a pointer, P, placed between them. A washer, R, is placed between the drawer end and the handle to take up any looseness and to allow the free turning of the rod.

A dial, S, is made of paper and the division marks and numbers placed upon it. The latch T is fitted in a U-shaped piece of metal, U, which is fastened to the inside of the drawer end where its heel will rest on the edges of the disks. When the right combination is made by turning the handle first one way and then the other, the latch will drop into the notches of the disks as they will be all in one place.

When the drawer is to be locked, turn the handle back from the last turn made for the combination and the latch will be driven upward into its keeper and the notches scattered so that the latch will not drop until the combination is again set.

The numbers for the combination

can be found after the disks are in place and by turning the handle until the notch comes up to the place for the



The Parts as They are Attached to a Drawer Front to Make a Combination Lock

heel of the latch. The number beneath the pointer is noted; then the next turned up in a like manner, all being done while the drawer is open and the disks in plain sight. The combination can be changed only by changing the location of the pins in the disks.—Contributed by C. B. Hanson, Fitchburg, Massachusetts.

How to Start Small Machine Screws

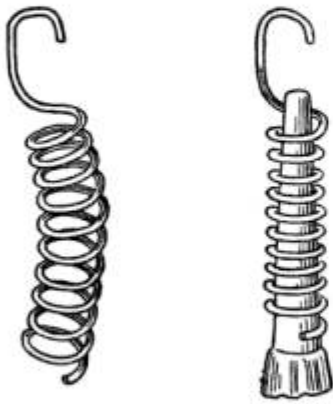
Small machine screws are sometimes very difficult to start, especially when used in parts of a machine that cannot be easily reached with the fingers. A good way to start them is by means of a piece of fine wire wound snugly around the screw under its head. They



can be placed and started by means of the wire and when the first threads have caught the screw it can be held by the screwdriver while the wire is withdrawn.—Contributed by F. W. Bently, Huron, S. D.

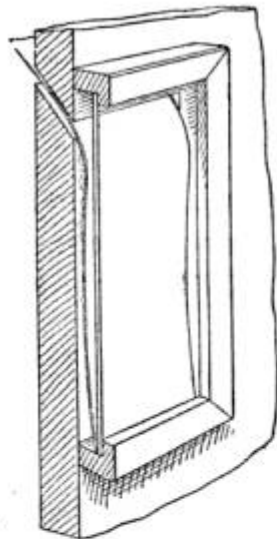
An Umbrella Holder for Display Purposes

A holder that is especially adapted for use in hanging umbrellas for display in a store can be easily made of a piece of wire wound in a coil, as shown in the sketch, to fit over the end on the umbrella stick. The coil at one end of the spring is formed into a hook so that the umbrellas may be hung in screweyes or on a line, as the case may be. The end of the umbrella is stuck into the spring, as shown, which grips it tightly.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.



Holder for a Milk Card

It is the general practice of milkmen to furnish a monthly card on which the housewife marks the needs of the day and then hangs it outside of the door for the information of the driver. This card also serves as a record for checking the accounts of the milk delivered during the month, and therefore it is desirable to protect it from snow and sleet.



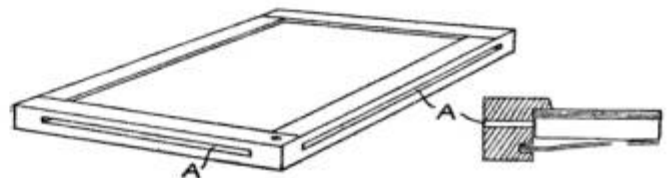
In order to furnish this protection and at the same time make it unnecessary for any one to go outside of the door to hang up the card on stormy days, one of our readers has submitted the following plan which he has used for some time.

On the outside of the kitchen door, where the milkman is to deliver his bottles, this man has fastened an ordinary picture frame with glass but

no backing except the door. Through the door and just below the upper edge of the glass is cut a thin slot inclining downward and outward so that the milk card can be easily pushed through the slot and thus be displayed behind the glass in the frame. By this protection it is kept free from mud, snow and ice. It is not necessary to step outside to place the card in the frame.

Frame for Printing Post Cards from Negatives

As I desired to print only a portion of some of my 5 by 7-in. plates on post cards and the part wanted was near the edge of the plate, I cut out the printing frame, as shown at A in the sketch, to accommodate that part

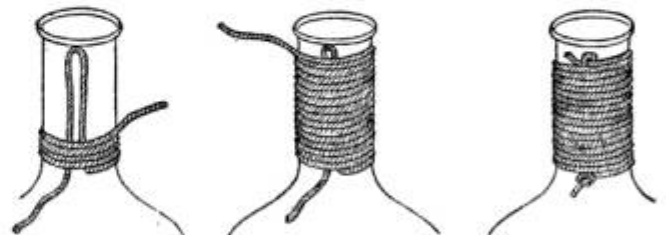


Slots Cut in the Frame to Receive the Post Cards without Bending Them

of the card I reserved for a margin. This permitted the card to be placed in the frame without making a bend.—Contributed by J. H. Maysilles, Rochelle, Ill.

Finger Protection on Laboratory Vessels

A simple way of protecting the fingers against being burned by laboratory vessels in which liquids are boiling or chemical reactions producing great heat are going on, is shown in



The Ends of the Cord are Held Tightly and the Winding Protects the Hands

the sketch. A rather thick cord or yarn is wrapped around the neck of the vessel in the manner shown, the

upper end being drawn through the loop at the top and cut off, and the lower end then pulled out and a knot tied in it close to the windings of the yarn.

Inlaying Metals by Electroplating

Very pretty and artistic effects of silver or nickel inlay on bronze, copper, etc., or copper on dark oxidized metals, may be obtained by means of etching and electroplating.

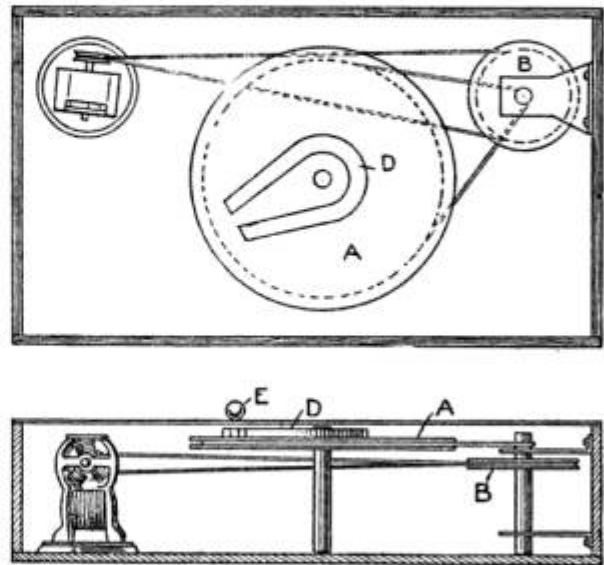
The metal on which the inlay is to be used is first covered with a thin coating of wax and the design scratched through to the metal with a sharp, hard point of some kind. The design is then etched in slowly with well diluted nitric acid, allowing the etching to penetrate quite deeply. The metal is then taken out and after a thorough rinsing in water is hung in the plating bath.

As the wax has been left on, the plating will fill the lines of the design only, and will not touch the covered surface. When the etched lines are filled, the object is taken out of the bath and the wax removed.—Contributed by S. V. Cooke, Hamilton, Can.

A Novel Show-Window Attraction

This moving show-window attraction can be simply and cheaply made. The things necessary are a small battery motor, a large horseshoe magnet and a large polished steel ball, perfectly true and round, such as used in bearings. The other materials usually can be found in any store. Procure some thick cardboard and cut two disks, 8 in. in diameter, and two disks, 7½ in. in diameter. Glue these together to make the wheel A, the larger disks forming the flanges. Make a smaller wheel, B, the size of which will be governed by the speed of the motor used. The wheel A is mounted in a box to run with its surface close to the under side of the cover, which should be of a thin, stiff cardboard. The wheel B is mounted on an axle that runs in metal bearings. The magnet D is

placed on the wheel A. The steel ball E is put on the thin cover of the box, and the magnet causes it to roll around as the wheel turns. The box

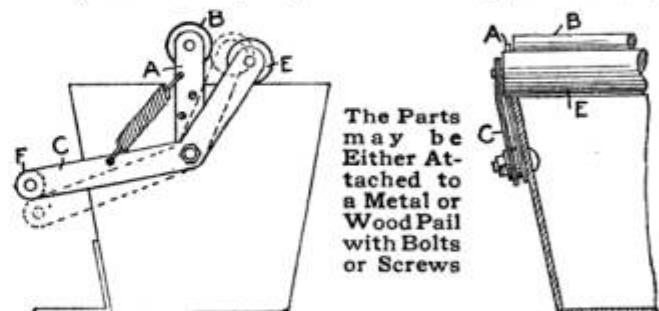


The Steel Ball is Caused to Roll Around on the Cover by the Moving Magnet

inclosing the mechanical parts should be placed out of sight when used in a window.—Contributed by Clarence Guse, Spokane, Wash.

How to Make a Mop Wringer

A mop wringer may be made and attached to an ordinary pail in the following manner: Two pieces of metal, A, are attached securely at opposite sides of the edge of the pail, holes being drilled in their upper ends to serve as bearings for the roller B. The piece of metal C, which is duplicated at the opposite side of the pail, is pivoted on a bolt. These pieces also carry a roller, E, at their upper ends,

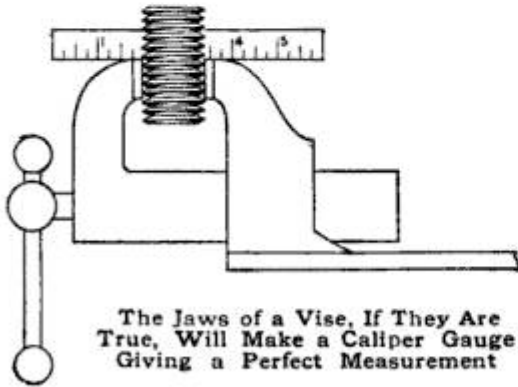


and have a crosspiece, F, at their lower ends. Discarded wringer rollers can be used for B and E. A coil spring is attached as shown, to keep the rollers separate and in a position to receive the mop. When the mop is placed be-

tween the rollers they are brought together by a pressure of the foot on the crosspiece F.—Contributed by J. Dennis McKennon, New Britain, Conn.

A Vise Used as a Caliper Gauge

Not infrequently it is desired to know the distance from one side to another of some part that cannot be



directly measured with a rule, and when no calipers are at hand. But with a vise handy, the measurement can be made with ease and with sufficient accuracy for all practical purposes if the vise is not too worn. This trick is particularly adapted for calipering threaded parts, as threads cannot be measured readily with ordinary calipers. How this may be done is shown in the sketch, which illustrates the method as applied to a screw. The work is gripped between the jaws of the vise and the opening then measured with a rule.—Contributed by Donald A. Hampson, Middletown, New York.

Homemade Tack Puller

A very handy tack puller can be made of a round-head bolt. On one side of the head file a V-shaped notch and screw a wood handle on the



The Shape of the Head Permits a Leverage Action That Lifts the Tack Easily

threads. This makes a very powerful puller that will remove large tacks from hardwood easily.

How to Make a Radium Photograph

The radium rays, like the X-rays, affect the photographic plate, as is well known, but it would naturally be supposed that the enormous cost of radium would prevent the making of such a photograph by the amateur.

It is a fact, however, that a radium photograph can be made at home at practically no cost at all, provided the amateur has patience enough to gather the necessary material, which is nothing else but broken incandescent gas mantles. These (especially Welsbach mantles) contain a salt of the rare metal thorium, which is slightly radioactive. The thing to do, then, is to collect a sufficient quantity of broken mantles to cover the bottom of a small cardboard box—a dryplate box, for instance—with a layer of powdered mantle substance. Upon this layer and pressed tightly against it is placed a piece of cardboard; then some metal objects, a button, hairpin, a buckle, or the like, are laid on the cardboard and covered with a sensitized paper. This is again covered with a piece of cardboard and the box filled with crumpled paper to the top. The cover is then put on, the box tied up with a piece of string and set in some place where it is sure to be left undisturbed.

The radium rays from the powdered mantles readily penetrate the cardboard and paper, but not the metal articles. Being very weak, the rays must be given four weeks to accomplish their work. After that time, however, if the sensitive paper is taken out, pictures of the metal objects in white on a dark background will be found on it. These pictures will not be so sharp as ordinary photographs, because the rays are not focused, but they fairly represent the originals and the experiment is an interesting one.

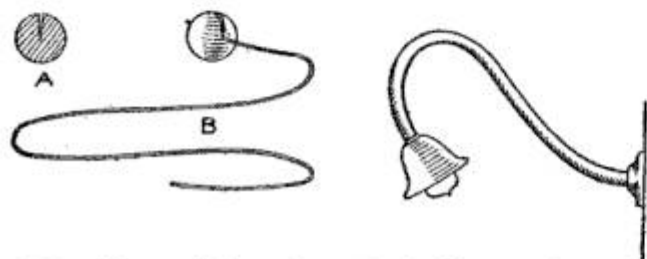
☞ A good imitation mahogany stain consists of 1 part Venetian red and 2 parts yellow lead, mixed with thin glue size, and is laid on with a woolen cloth.

Fountain for an Ordinary Pen

Fill the hollow end of an ordinary penholder with cotton—not too tightly—and one dip of the pen will hold enough ink to write a full page. The cotton should be changed each day. A small piece of sponge will answer the same purpose. It is necessary to dip the pen deeply into the ink.—Contributed by J. E. Noble, London Junction, Ontario.

Pulling Wire through Curved Electric Fixtures

To facilitate the running of electric wires through curved fixtures, nick a heavy shot, A, and fasten it on a cord,

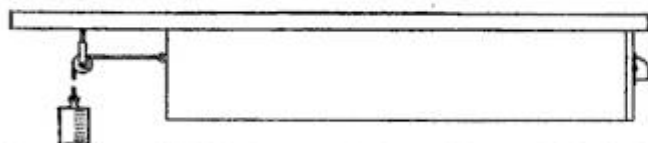


A Shot That will Pass through the Fixture Arm will Carry a Cord for Pulling in the Wires

B, in the same manner as a fishline is weighted. The shot will roll through the fixture tube, carrying the cord with it. A cord strong enough to pull the wires through can be easily drawn through the opening in this manner. The shot should, of course, not be so large that it can possibly bind in the tube.

An Automatically Closing Drawer

A very ingenious way to have a drawer close automatically is to attach a weight so that the rope or cord will pull on the rear end of the drawer. The sketch clearly shows the device which is an attachment similar to that used for closing gates. This can be

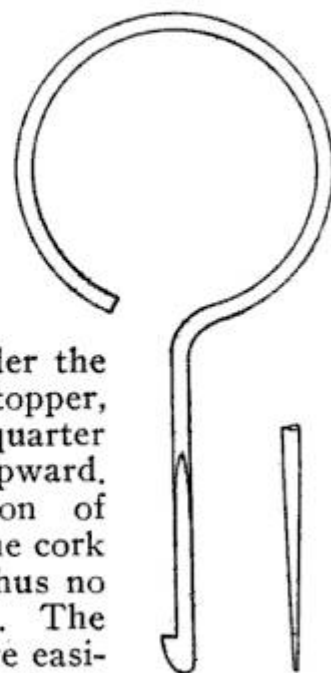


The Rope and Weight Attached to the Back End of the Drawer Pulls It Closed

applied to drawers that are frequently drawn out and in places where a person is liable to have the hands full.

A Cork Puller

The stopper of any ordinary bottle can be easily removed with a puller such as shown in the sketch. The puller is inserted between the stopper and the neck of the bottle until the hook



end will pass under the bottom of the stopper, then given a quarter turn and pulled upward.

The construction of the puller vents the cork as it enters and thus no vacuum is created. The cork is pulled more easily than with an ordinary corkscrew, and there is no danger of tearing the cork to pieces.

Uses for a Bamboo Pole

Select a good bamboo pole, about 18 ft. long, and cut it into three lengths as follows: A piece from the top, $2\frac{1}{2}$ ft. long; the next length, $5\frac{1}{2}$ ft. long, and the remaining end of the pole, about 10 ft. long. The $2\frac{1}{2}$ -ft. length is



FIG. 1



FIG. 2



FIG. 3

A Bamboo Pole Cut in Three Pieces Makes a Window-
Shade Stick, Duster Holder and Clothesline Pole

equipped with a screw hook in the smaller end, as shown in Fig. 1. This stick is useful in lowering window shades that have a ring or screw eye attached to the lower part of the shade. When the stick is not in use, it is hung on the edge of the window casing.

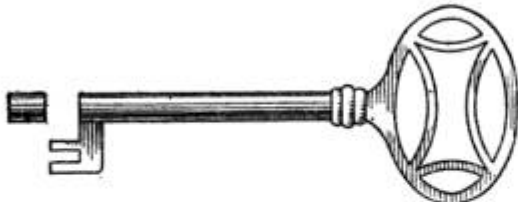
The $5\frac{1}{2}$ -ft. length makes the long handle for a duster. Procure an old-style lamp-chimney cleaner, wind a cord around the wires a few inches below the point where they begin to

spread to keep them from coming apart, then cut or file the wires off 2 in. below the winding. This leaves a straight shank, over which a ferrule is slipped before it is inserted into the small end of the pole. Fill the remaining space in the pole end with plaster of Paris, and when it has set, slip the ferrule into place on the pole end. If a ferrule is not at hand, a fine wire can be wound around the end to prevent the pole from splitting. When using this pole to dust hardwood floors, tops of doors, window casings and picture frames, put a dusting cloth into the claws and slide the ring into place, as shown in Fig. 2.

The longer and larger end of the pole is used as a clothesline pole. One end of this pole is fitted with a yoke made of No. 6 gauge galvanized wire, as shown in Fig. 3. The wire for the yoke is 10 in. long, and after bending it in shape, the two upper ends should be 2 in. apart and the yoke 2 in. deep. Insert the straight end of the wire into the smaller end of the pole and set it in firmly with plaster of Paris. The end of the pole should be securely wound with wire to keep the bamboo from splitting.—Contributed by Gertrude M. Bender, Utica, N. Y.

Making Common Lock Less Pickable

The ordinary lock can be readily changed so that it will be quite impossible to pick it with a common key.



The Small End Cut from the Key is Fastened on the Pin of the Lock

The way to do this is to cut off the small hollow portion of the key that fits over the pin. This part is placed on the pin of the lock and soldered, or fastened by any other means, so it cannot come out of the lock. This will prevent any ordinary key from entering the keyhole.—Contributed by A. J. Hamilton, Benton, Ark.

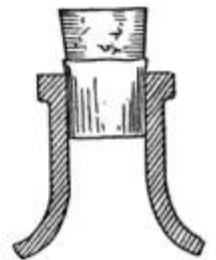
To Color Tan Leather Black

An inexpensive and effective way to blacken tan leather is as follows: The leather is first rubbed with a 10-per-cent solution of tannic acid, which may be purchased at any drug store. This treatment should be applied and the leather well dried. It should be rubbed with a cloth hard enough to produce a polish, then apply a 10-per-cent solution of iron sulphate. A chemical reaction takes place as the last solution is rubbed into the leather, making it black. After this is dry, the leather can be polished in the usual way.

To Prevent Corks Sticking in Bottle Necks

Corks will always adhere to the necks of bottles containing glue or other sticky liquids, with the result that it becomes necessary to cut or dig the cork into small pieces in order to remove the contents from the bottle.

A simple and effective way to prevent a cork from sticking is to place a small piece of waxed paper on the bottle opening so that when the cork is pressed in, the paper will be between the cork and glass, as shown.



To Remove Rust Stains from Clothing

Many times when working around machinery, the clothes will come in contact with iron and get rust stains. These may be removed by using a weak solution of oxalic acid which must be applied carefully as it is highly poisonous. Sometimes the stain can be removed by washing the spot in buttermilk, in which case rubbing is necessary.

Small bits of onion placed in a room will absorb the disagreeable odors of paint and turpentine.

Eraser Holder

Any small piece of steel with a point, similar to that shown in the sketch, will make a good eraser holder. The saving of erasers is nothing compared to the convenience of having a small eraser with a chisel edge or point when delicate erasing is required. It is not clumsy as the usual chunk of rubber with a blunt point, for the person erasing can see what he is doing. I use a leg of an old pair of dividers and cut my erasers in four parts in shapes similar to that shown in the sketch by the dotted lines, and can use them easily until they are about



A Very Small Eraser can be Held on the Point and Used for Delicate Erasures

the size of a pea. The friction between the rubber and steel, after the point has been inserted into the rubber, holds the two together nicely.—Contributed by James F. Burke, Lakewood, O.

Bleaching Ivory

A good method to bleach ivory ornaments is to rub on a solution made of a small quantity of unslaked lime, bran and water. The mixture should be wiped off after the ivory has become sufficiently bleached, and the surface then rubbed with sawdust or magnesia, which gives it a brilliant polish.

A Soap Shake

To utilize scraps of soap, make a soap shake of a medium-size baking-powder can, as shown in the sketch.

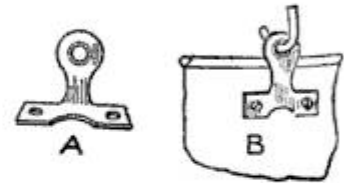


Punch holes in the can with an ice pick or some other sharp-pointed instrument, and attach a large wire to the center, twisting the ends to form a handle.—Contributed by Elizabeth P. Grant, Winchester, Virginia.

Ear Repair on a Bucket

A broken ear for a bail on a metal pail or bucket can be replaced with a window-shade fastener, such as shown at A in the sketch.

The base of the fastener is turned down flat and attached with screw bolts or rivets, as shown



at B.—Contributed by Harold Robinson, Suffern, N. Y.

Cleaning Dirt from Tufts in Upholstering

A handy device for cleaning furniture upholstery and vehicle-seat tuftings may be easily made as follows:

Take an ordinary round paintbrush and cut the handle off, leaving it about $1\frac{1}{2}$ in. long, then saw a V-shaped notch in it, as shown in Fig. 1. Attach the brush to the ratchet screwdriver, Fig. 2, by inserting the screwdriver blade in the notch of the brush handle, and secure it by wrapping a strong cord around the handle. Place the brush in the tuft and work the screwdriver handle, as in turning a screw. A few quick turns of the brush will throw out the dirt which is impossible to remove with a straight brush.



FIG. 1



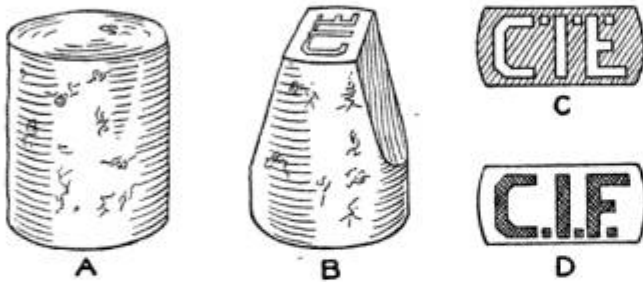
FIG. 2

Painting Lead Pipe

The paint applied to lead pipes will chip and peel off, and to prevent this I first cover the lead surface with a thin coat of varnish, then apply the paint on the varnish. A lead pipe painted in this way will retain its coating.—Contributed by F. Schumacher, Brooklyn, N. Y.

Substitute for a Rubber Stamp

A large number of coupons had to be marked, and having no suitable rubber stamp at hand, I selected a



Initials Cut in a Cork Served the Purpose in the Absence of a Rubber Stamp

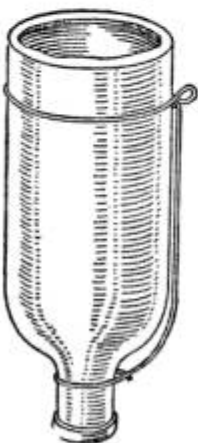
cork with a smooth end and cut the initials in it. I found that it worked as well, not to say better, than a rubber stamp. An ordinary rubber-stamp pad was used for inking. Angular letters will cut better than curved ones, as the cork quickly dulls the edge of any cutting tool.—Contributed by James M. Kane, Doylestown, Pa.

A Furniture Polish

A good pastelike furniture polish, which is very cheap and keeps indefinitely, can be made as follows: Mix 3 oz. of white wax, 2 oz. of pearlash, commonly known as potassium carbonate, and 6 oz. of water. Heat the mixture until it becomes dissolved, then add 4 oz. of boiled linseed oil and 5 oz. of turpentine. Stir well and pour into cans to cool. Apply with a cloth and rub to a polish. The paste is non-poisonous.

A Hanging Vase

A very neat and attractive hanging corner vase can be made of a colored bottle. The bottom is broken out or cut off as desired and a wire hanger attached as shown. The opening in the neck of the bottle is well corked. Rectangular shaped bottles fitted with hangers can be used on walls.—Contributed by A. D. Tanaka, Jujiya, Kioto, Japan.

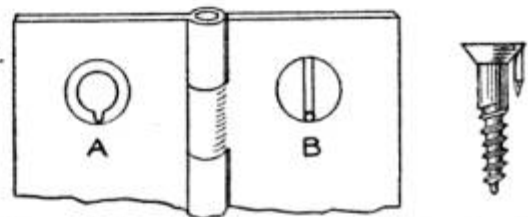


Filing Soft Metals

It is well known to mechanics that when lead, tin, soft solder or aluminum are filed, the file is soon filled with the metal and it will not cut. It cannot be cleaned like the wood rasp by dipping it into hot water or pouring boiling water over it, but if the file and the work are kept wet with water, there will be no trouble whatever. Both file and work must be kept thoroughly wet at all times.—Contributed by J. H. Beebee, Rochester, N. Y.

Locking Screws in Door Hinges

When screws once work loose in hinges of doors they will never again hold firmly in the same hole. This trouble can be avoided if the screws are securely locked when they are first put on the door. The sketch shows a



The Screw is Permanently Locked with a Small Nail Driven into the Slot Prepared for It

very successful way to lock the screws. The hole in the hinge for the screw is filed to produce a notch, as shown at A, deep enough to receive a small wire nail or brad, which is driven through the slot in the screw head at one side, as shown at B.

To Remove Grease from Clothing

Equal parts of ether, ammonia and alcohol make a solution that will readily remove grease from clothing. The solution must be kept away from fire, and should be contained in corked bottles as it evaporates quickly, but can be used without danger. It removes grease spots from the finest fabrics and is harmless to the texture.

☞ Jeweler's rouge rubbed well into chamois skin is handy to polish gold and silver articles with.

PATENTS, PRACTICAL
NORFOLK, VA
OR UNIQUE



Fig. 1

EAR ATTACHMENT FOR MEGAPHONES (Fig. 1)—A provision that makes the megaphone an aid in the receiving of sound as well as in its transmission is here shown.



Fig. 2

DOUGH RAISER (Fig. 2)—This illustration shows a dough-raising attachment for kitchen tables, and comprises a receptacle underneath the table top and a lamp and an arrangement for transmitting the heat from a lamp into this receptacle.



Fig. 3

MEASURING THE STRIKING FORCE OF GOLF CLUBS (Fig. 3)—Believing it desirable to ascertain the striking force of golf clubs, an English inventor has designed a club having a blow-measuring mechanism.

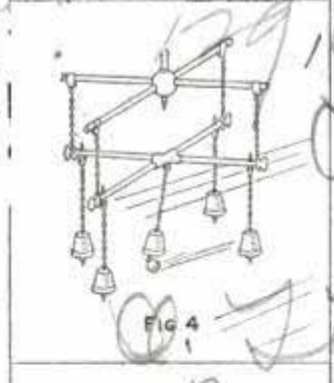


Fig. 4

A BELL GAME FOR BILLIARD TABLES (Fig. 4; British patent)—In a bell game for billiard tables, a number of bells are supported above the table in such a manner that the points of the hammers may be struck by the billiard balls, thus sounding the bells.



Fig. 5

EYEGGLASS CASE AND SCREWDRIVER (Fig. 5)—The wearers of eyeglasses often have need of a tiny screwdriver for use in tightening a loose screw or making an adjustment, but it is seldom that such a screwdriver is at hand. To make sure that such a tool be available, however, one inventor has designed a combined eyeglass case and screwdriver. The handle of one of the hinges is a tube for the screwdriver.

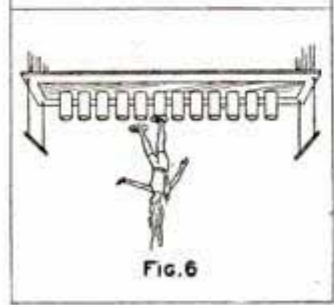


Fig. 6

WALKING ON THE CEILING (Fig. 6)—An apparatus for prope performance by means of which they may walk upside down in imitation of a fly on a ceiling is here illustrated. A series of vacuum cups, open at their bottoms, are attached to the under side of an air chamber containing air at atmospheric pressure, and the performer, with disks attached to the soles of his shoes, walks along upside down by inserting these disks first in one vacuum cup and then another.

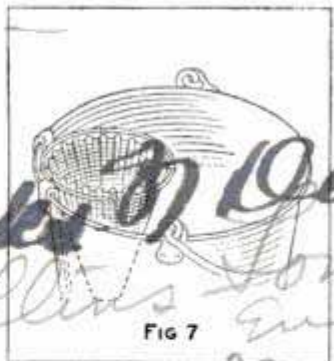


Fig. 7



Fig. 8

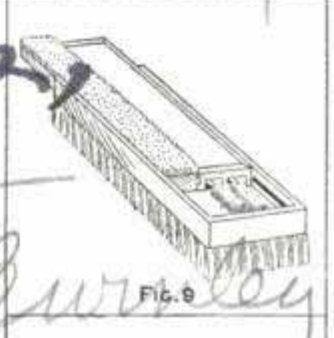


Fig. 9



Fig. 10

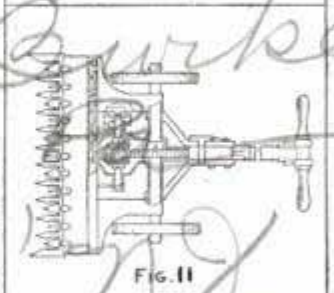


Fig. 11

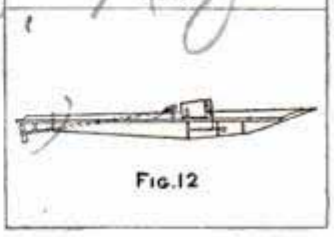


Fig. 12

MOP WRINGER (Fig. 7; British patent)—The inverted-cone mop wringer, designed to be detachably supported on one side of the pail, has a vertically fluted inner surface. The mop is inserted in the cone, forced downward and twisted around, the water thus wrung from it dropping through the opening in the bottom of the cone into the pail.

DUSTER FOR VACUUM CLEANERS (Fig. 8)—A duster mat which may be flicked over the surface to be dusted, disturbing the dust, which is then drawn through the mat into a hollow handle and thence to the dirt receptacle of the vacuum outfit, is here shown. The material forming the duster mat is kept from being drawn into the hollow handle by means of a globular wire protector.

NESTED CLOTHES BRUSHES (Fig. 9; British patent)—This full-sized clothes brush has a lid divided longitudinally, one part forming a narrow brush for cleaning the brim of a hat, and the like, while the remaining portion of the sliding lid has channels in which smaller brushes are held when not in use.

COMBINED LIFE BUOY AND BATHING SUIT (Fig. 10)—This bathing suit comprises a combination of a detachable buoyant garment fitted next to the body. The buoyant front and back portions for the body and legs are connected together into a harness by elastic bands.

HAND-PUSHED MOWING MACHINE (Fig. 11)—This little mowing machine is designed especially for the mowing of small areas, such, for instance, as yards or strips of parkway where the grass has grown too long to be cut by the ordinary lawn mower. It is pushed over the ground in the same way as the latter, the revolving wheels actuating mechanisms which operate the cutting teeth.

A NEW HYDROPLANE DESIGN (Fig. 12; British patent)—This hydroplane has a hull having the form of an elongated arch, the crown of which is inclined downward from bow to stern, and the sides of which are provided with lateral planes. When moving forward, the tendency of the air beneath the arch is to raise the vessel out of the water. Horizontal fins are provided whereby the bow of the vessel may be raised or depressed.

H. M. van Weede

MR. LEWIS WHITE ALLEN, the Denver physiologist, was giving an informal talk on physiology upon the windy, sea-fronting porch of an Atlantic City hotel.

"Also," he said, "it has lately been found that the human body contains sulphur."

"Sulphur?" exclaimed a girl in a blue and white blazer. "How much sulphur is there, then, in a girl's body?"

"Oh," said Dr. Allen, smiling, "the amount varies." "And is that," asked the girl, "why some of us make so much better matches than others?" Exchange.

Some salesmen are equal to almost any emergency and do not spare the "other car" when occasion requires.

"But the Blank car is guaranteed for life," protested a prospective purchaser to a salesman of the sort.

"Yes, I know it is," retorted the quick-witted salesman, "but our car is guaranteed for a whole year."

It required several moments for the prospective purchaser to see the point.—Motor World.

The story goes that the celebrated violinist, Wilhelmy, had been engaged to play at a private party given by a banker in Vienna. He was "hired" to play from seven o'clock to ten. The wealthy host, it must be premised, had no knowledge whatever of music. The great violinist began his performance by playing the andante of the Mendelssohn's concerto. The man of money was dumfounded, and turning to his guests said, in a sort of stage aside, "Excuse me, you see what these musicians are; I engage him to play by the hour and he plays slowly!"—The Violinist.

Donald and Jeanie were putting down a carpet, Donald slammed the end of his thumb with the hammer, and began to pour forth his soul in language befitting the occasion. "Donald! Donald!" shrieked Jeanie, horrified, "Dinna swear that way!" "Wummun," vociferated Donald, "gin ye know ony better way, now is the time to let me know it!"

"I see you've taken out a license for a motor car, Bill," said Jimpson. "I didn't know you had a car."

"I haven't," said Bildad.

"Then what the dickens has induced you to take out a license?" demanded Jimpson.

"Oh, it's sort of pleasant to feel that I can have one if I want to," said Bildad.—Harper's Weekly.

Willie finally persuaded his aunt to play train with him. The chairs were arranged in line and then he said:

"Now, you be the engineer and I'll be the conductor. Lend me your watch and get up into your cab." He then hurried down the platform, timepiece in hand.

"Pull out there, you red-headed, pie-faced jay!" he shouted to the astonishment of the young woman.

"Why, Willie!" she exclaimed in amazement.

"That's right, chew the rag," he retorted. "Pull out. We're five minutes late already."

They have had to forbid his playing down by the tracks.—Illinois Central Employees Magazine.

An Italian who kept a fruit stand was much annoyed by possible customers who made a practice of handling the fruit and pinching it, thereby leaving it softened and often spoiled. Exasperated beyond endurance, he finally put up a sign which read:

If you must pincha da fruit—

pincha da cocoanut!—Lippincott's.

We hear that the management of the Louvre have now made it possible for all comers to procure portable stools on which to sit while viewing the masterpiece.

It is hoped that this innovation will render it unnecessary for visitors to take the pictures home to study, as was done in the case of Leonardo's "Mona Lisa."—Punch.

In a fashionable restaurant a new multi-millionaire with no knowledge of French and no desire to expose his ignorance, pointed to a line on the menu and said to the waiter:

"I'll have some of that."

"I'm sorry, sir," the waiter answered, "but the band is playing that."—Ladies' Home Journal.

While I was running a bolt cutter at the Rock Island shops in Chicago,

writes a contributor to Railway and Locomotive Engineering, I boarded at a house much frequented by locomotive engineers and firemen. These men talked a great deal about their tremendous feats in getting over certain hills without the help of a second locomotive.

My opposite neighbor at a table, a young fellow who ran a lathe in the shop, grew tired of this monotonous bragging; he thought he was entitled to do a little talking himself. One evening he called out to me:

"Well, I went over and saw that new machine today, and it's astonishing the fine work it does."

"How does it work?" I inquired.

"Well," said James, "by means of a pedal attachment, a fulcrum lever converts a vertical reciprocating motion into

a circular movement. The principal part of the machine is a huge disk that revolves in a vertical plane. Power is applied through the axis of the disk, and when the speed of the driving arbor is moderate, the periphery of the apparatus is traveling at a high velocity. Work is done on this periphery. Pieces of the hardest steel are by mere impact reduced to any shape the skillful operator desires."

"What in the name of sense is that machine, anyway?" demanded Tom Briggs.

"Oh, it's a new grindstone," replied James, and a silence that could be cut with a butcher knife fell upon the crowd.

"I've a kitchenette in my flat. What's the feature of yours, Jones?"

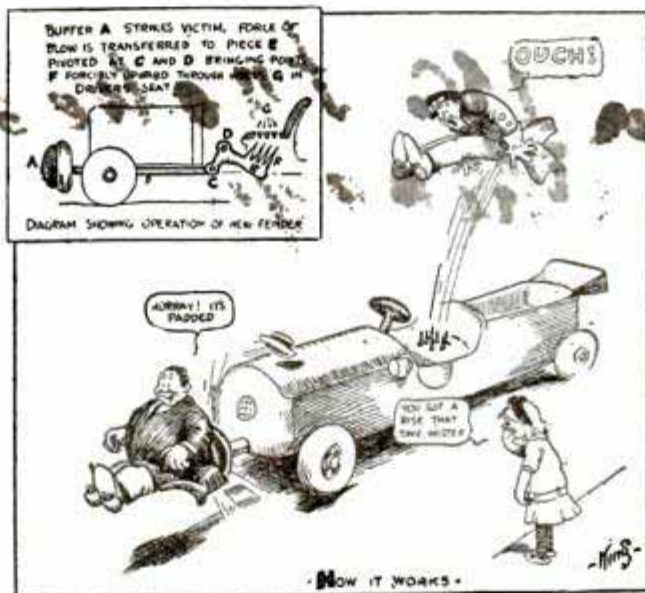
"A cellarette. And of yours, Smith?"

"I've got a suffragette in mine."—Exchange.

"You may give three important illustrations of the power of the press," says the teacher to the class.

The pupil who has not hitherto distinguished himself is first to reply:

"Cider, courtship and politics."—Judge.



The Victim's Revenge—A Chicago Inventor's Suggestion

—Chicago Tribune

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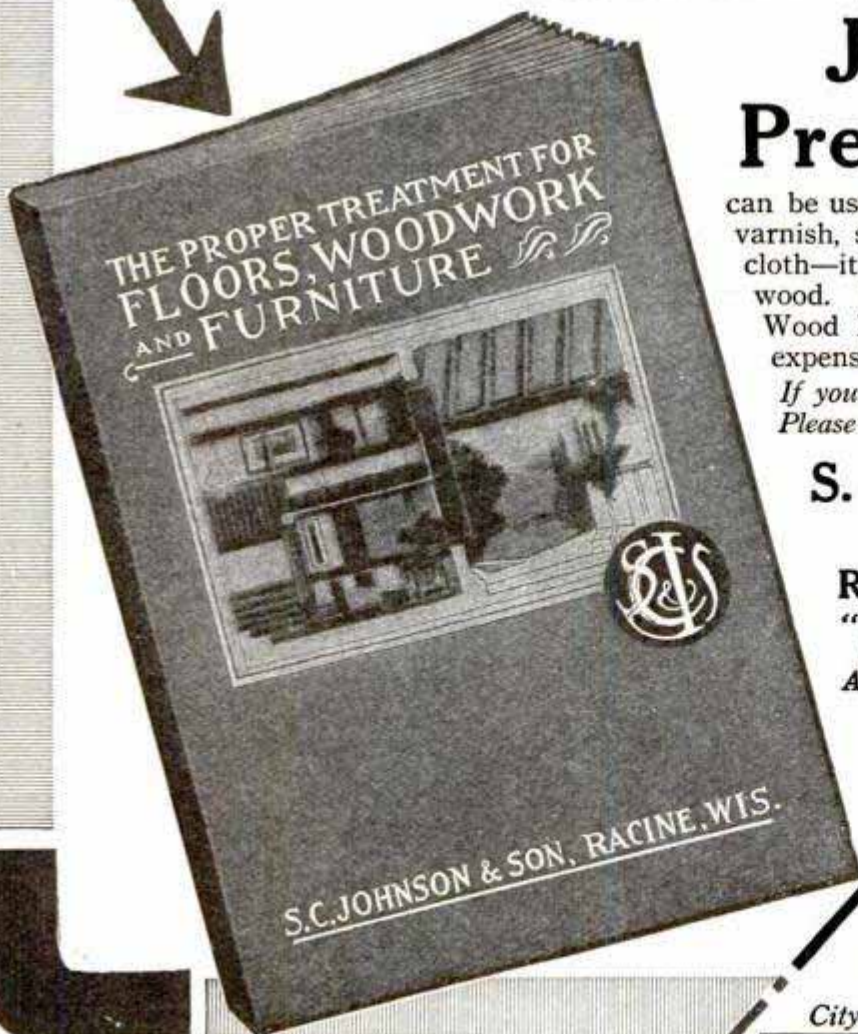
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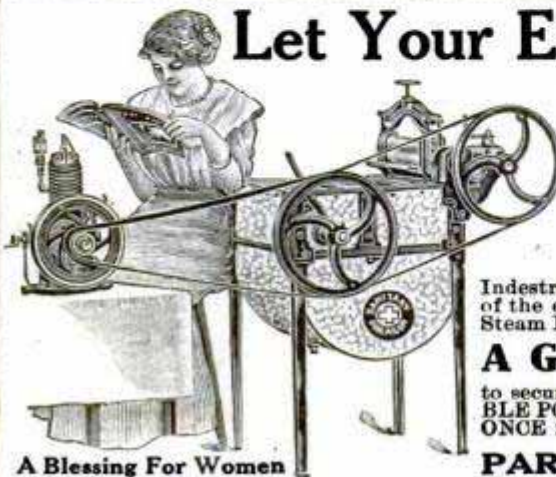
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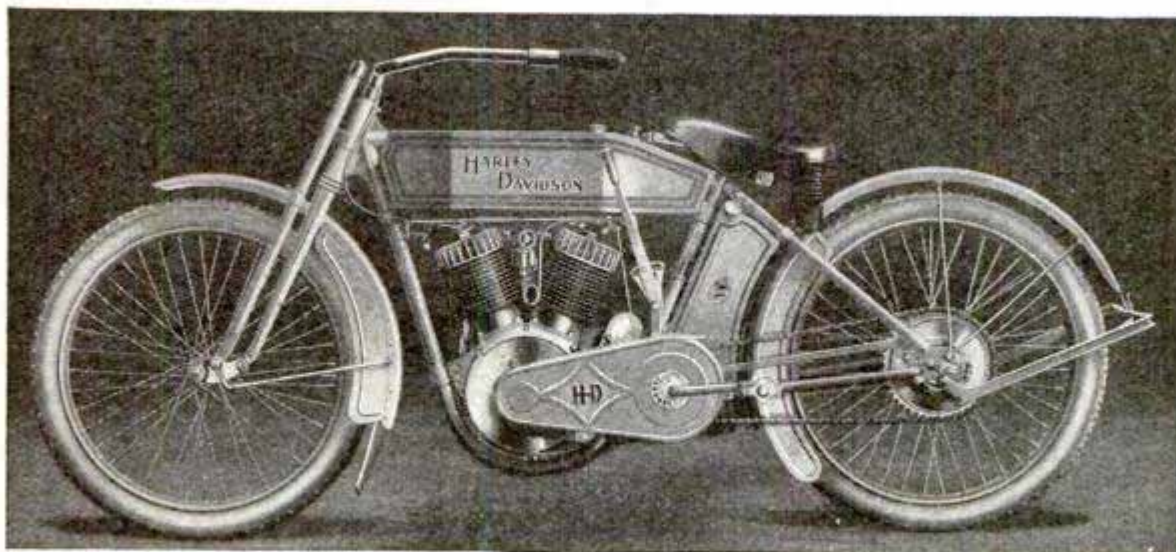
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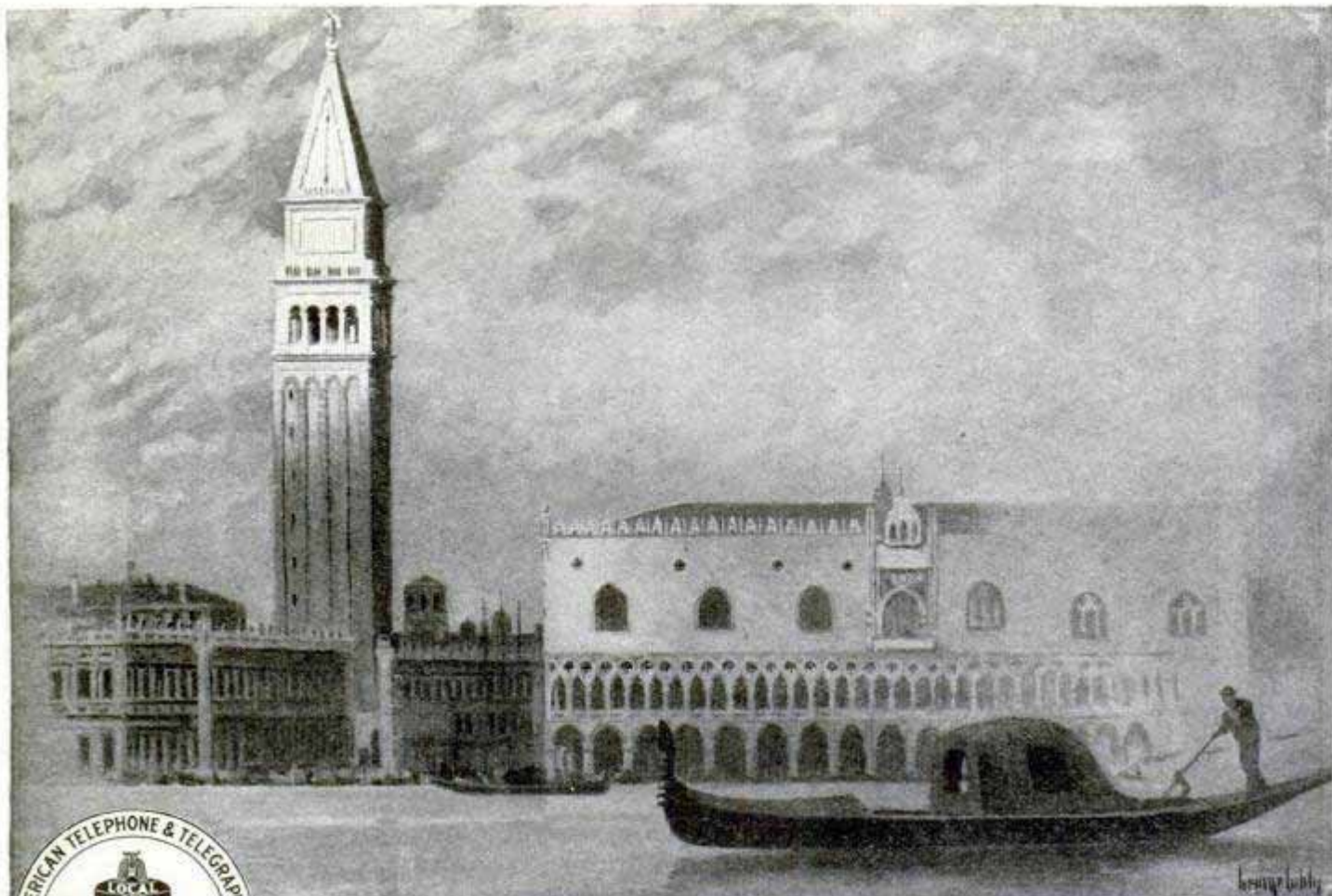
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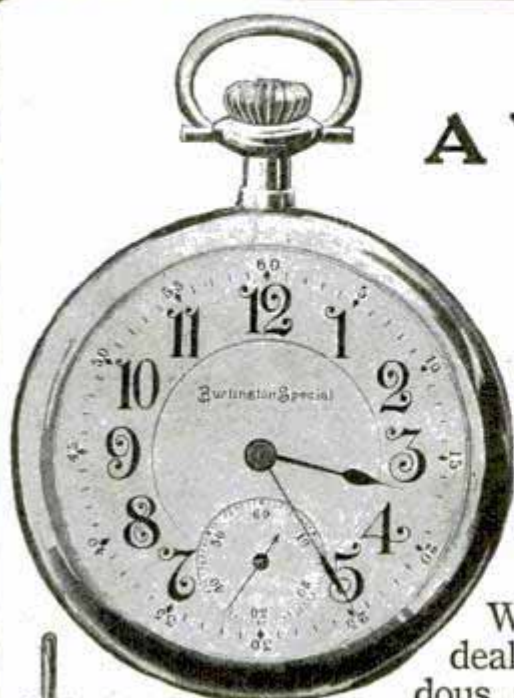
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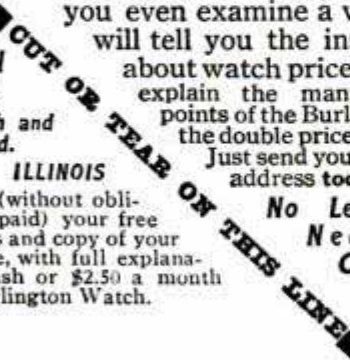
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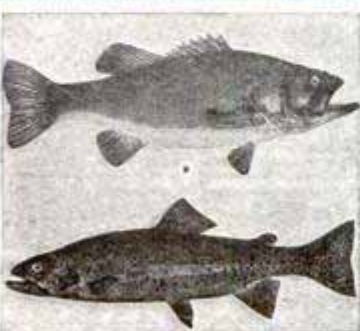
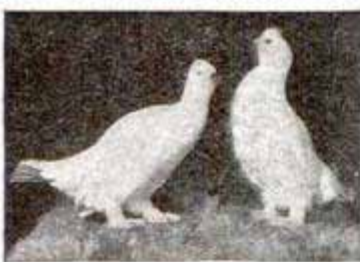
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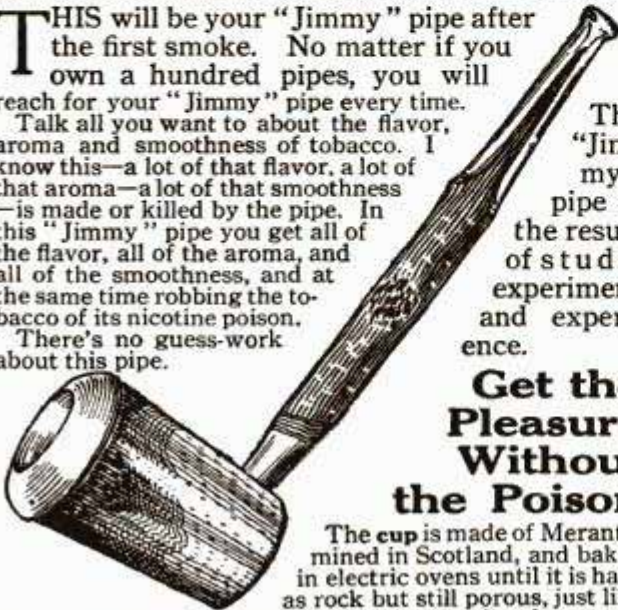
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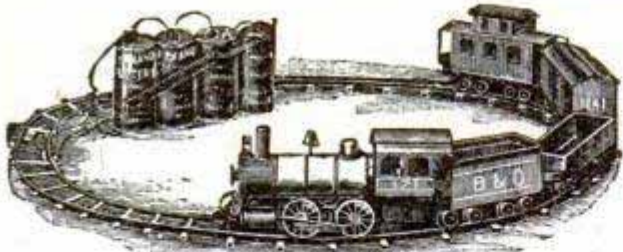
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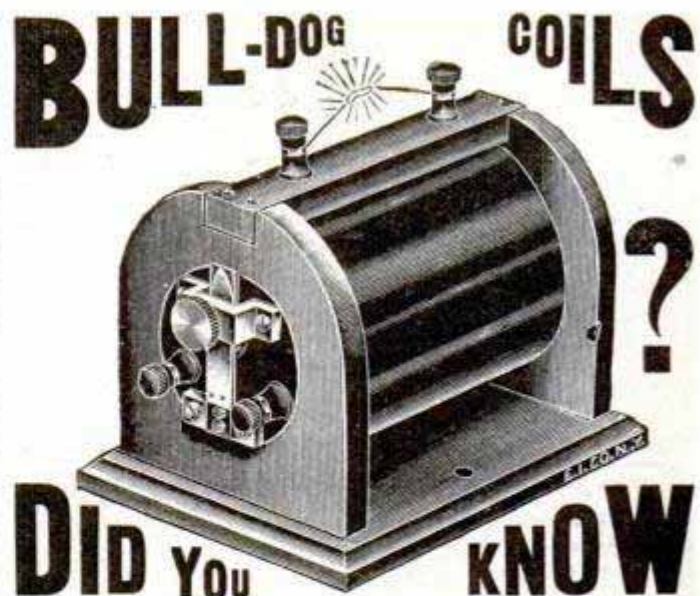
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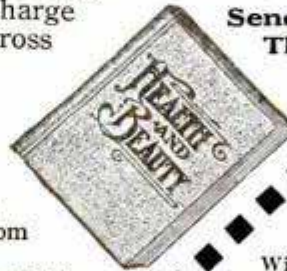
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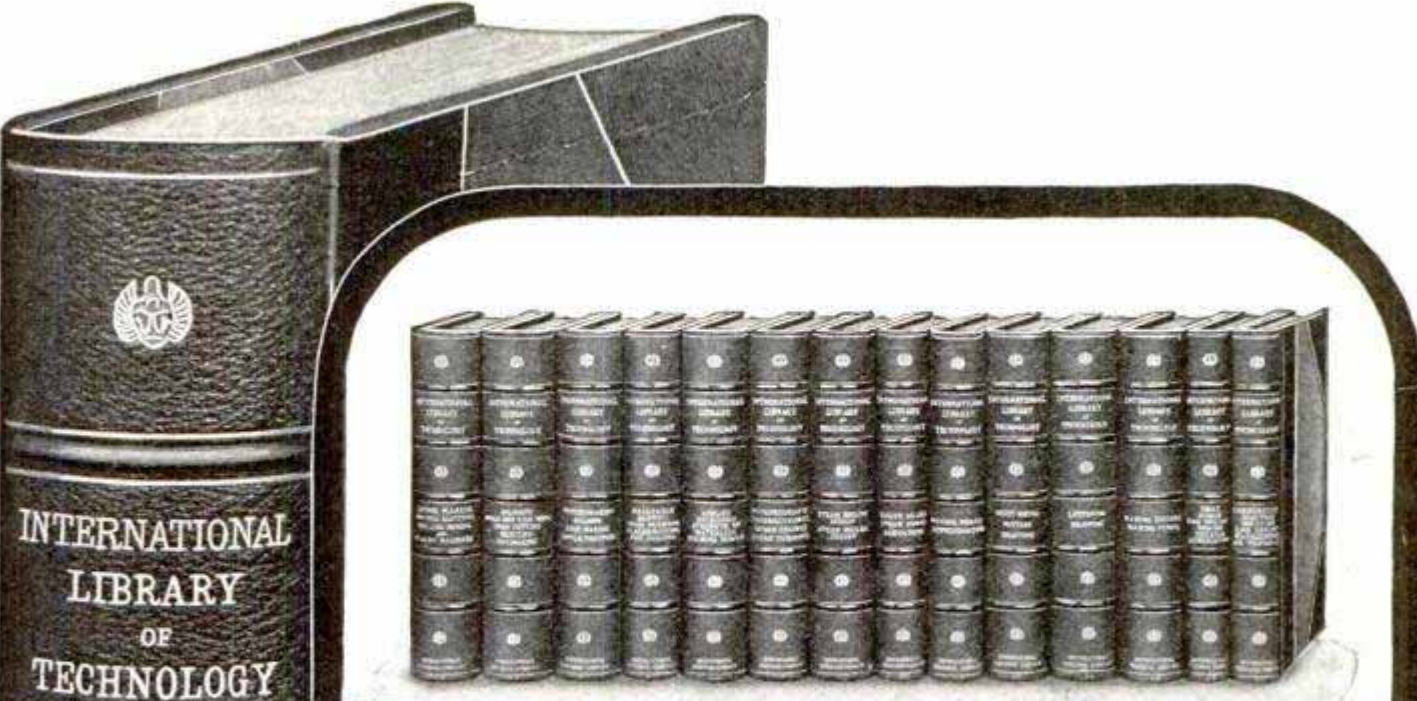
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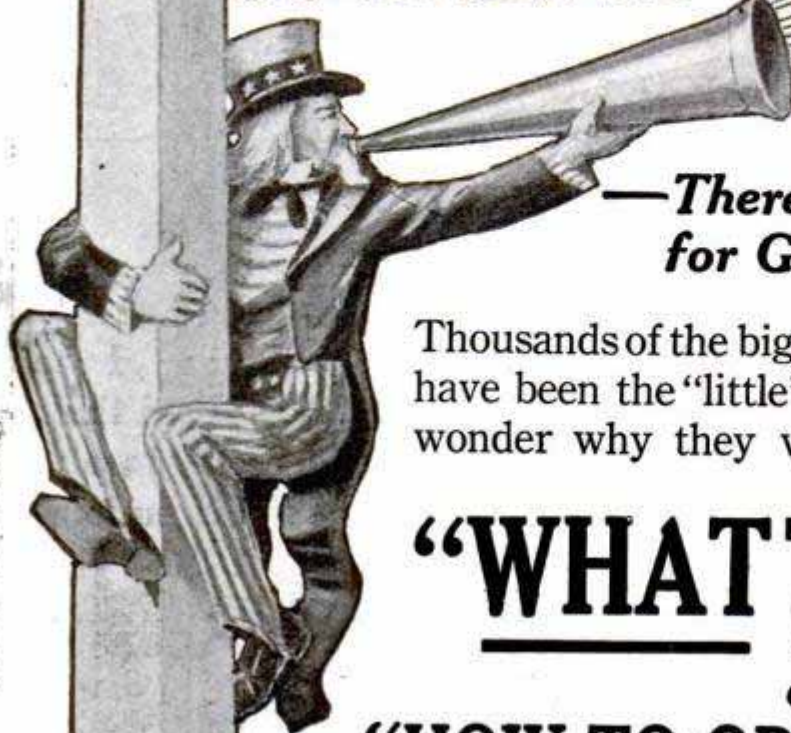
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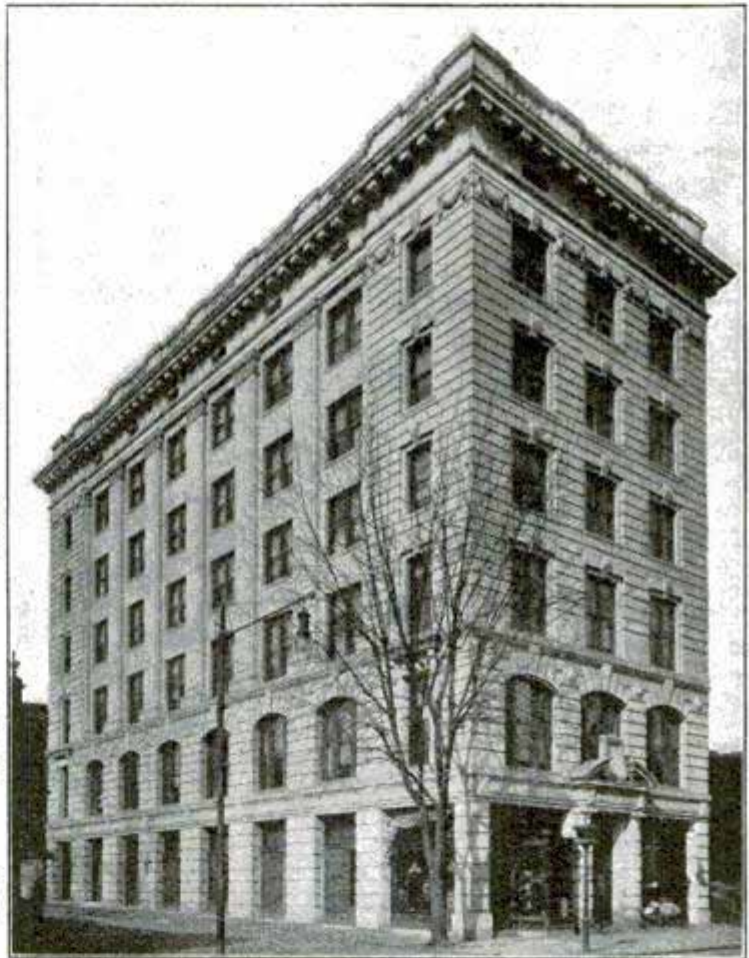
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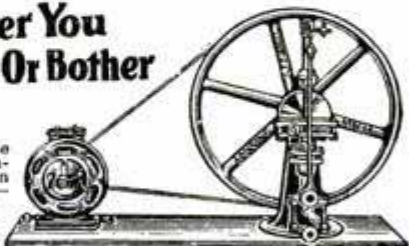
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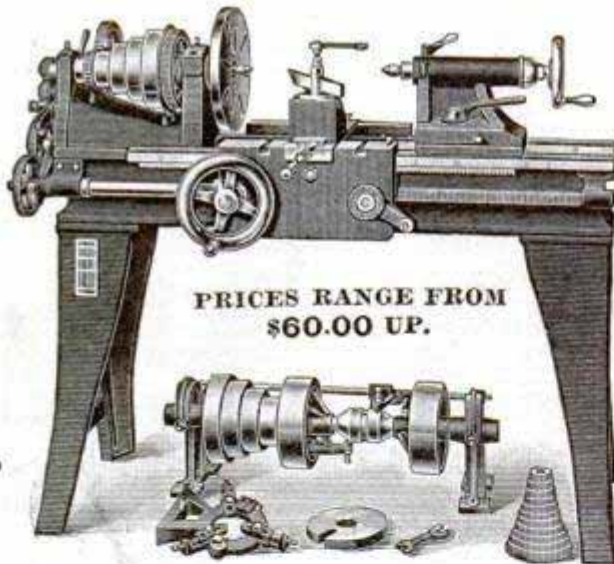
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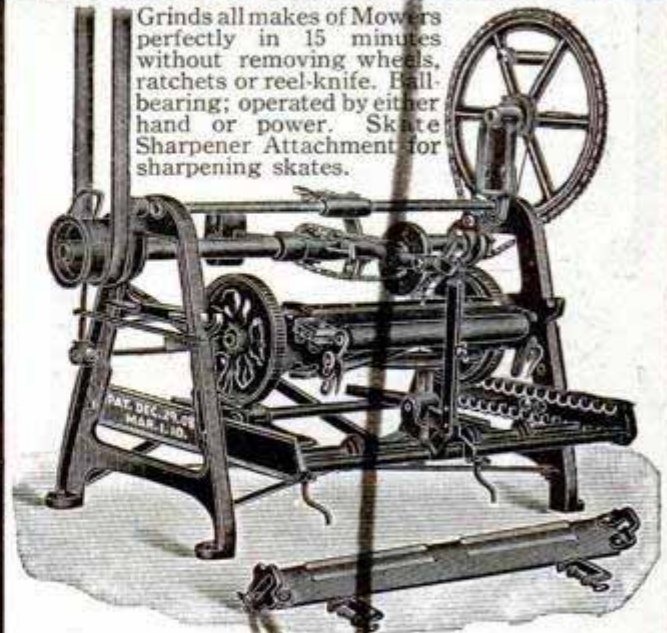
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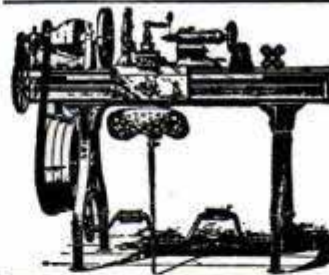
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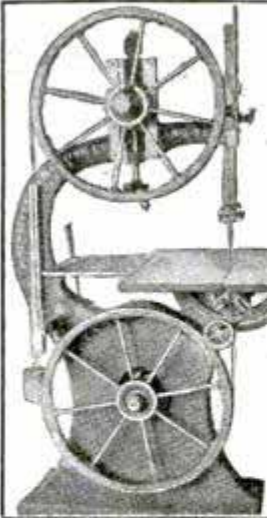
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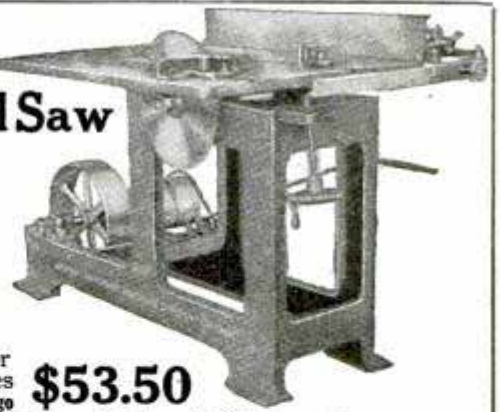


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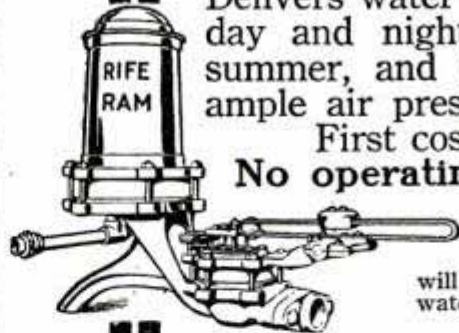
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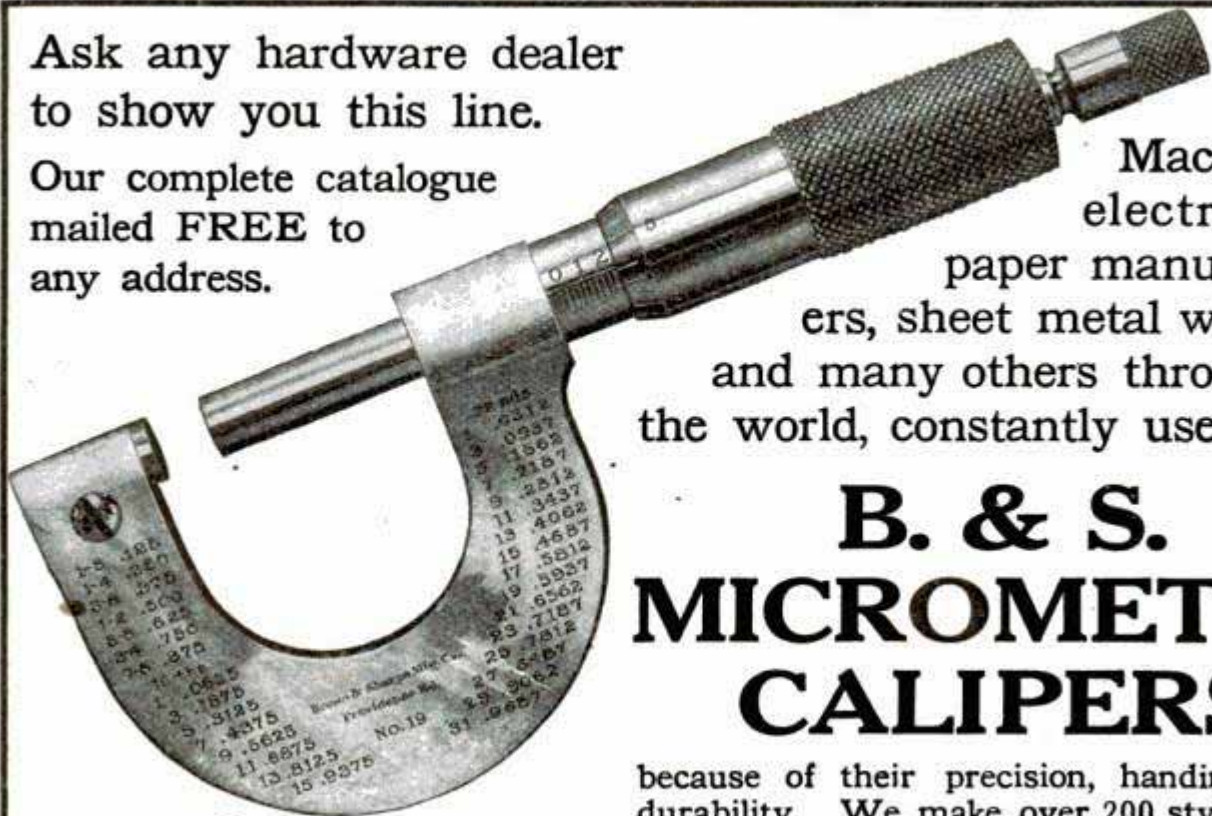
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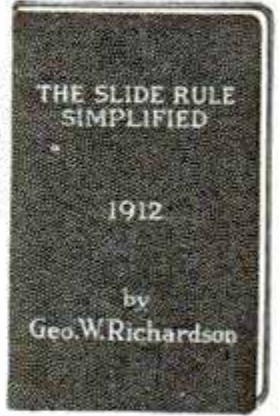
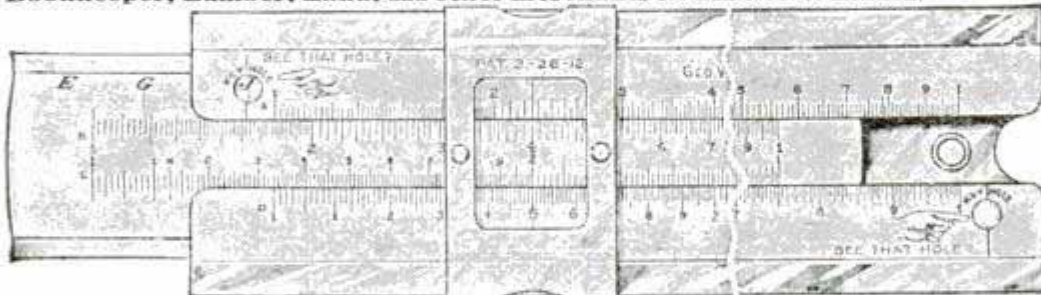


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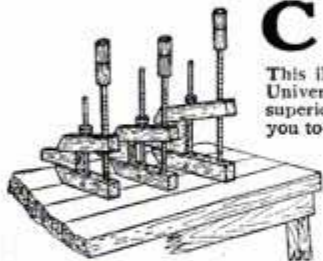
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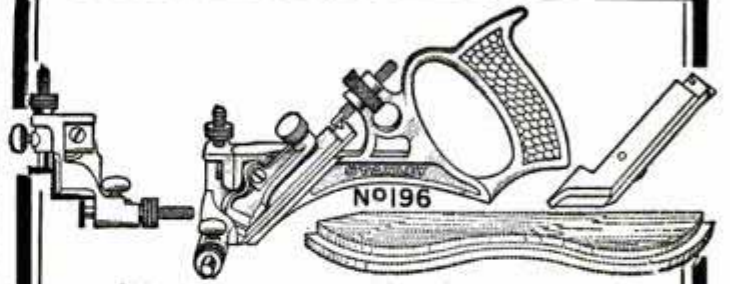
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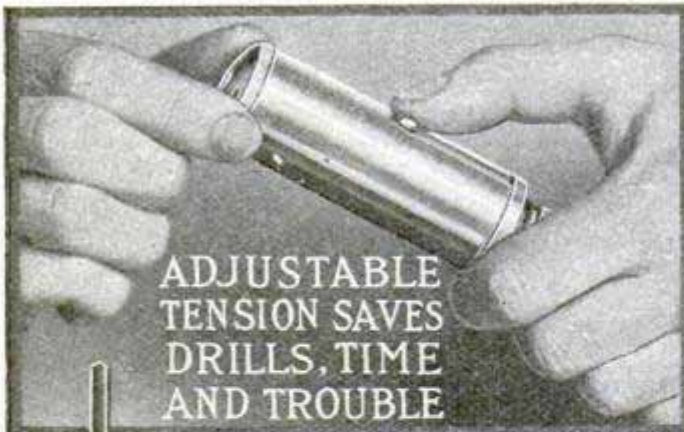
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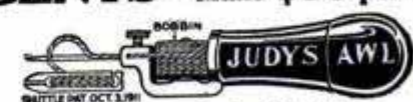
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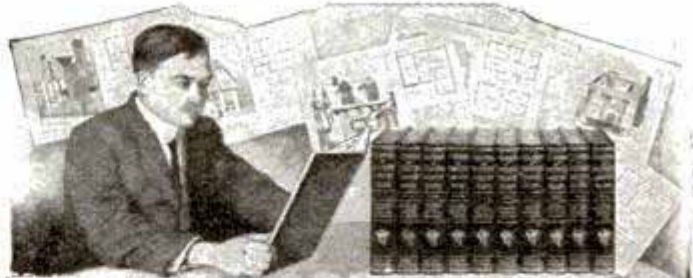
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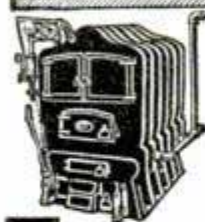
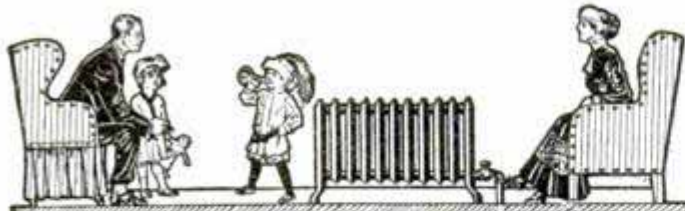
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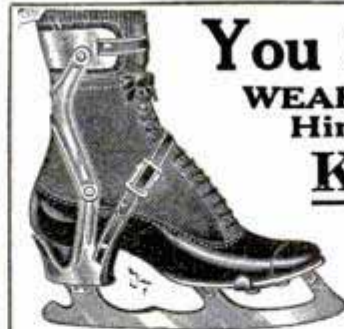
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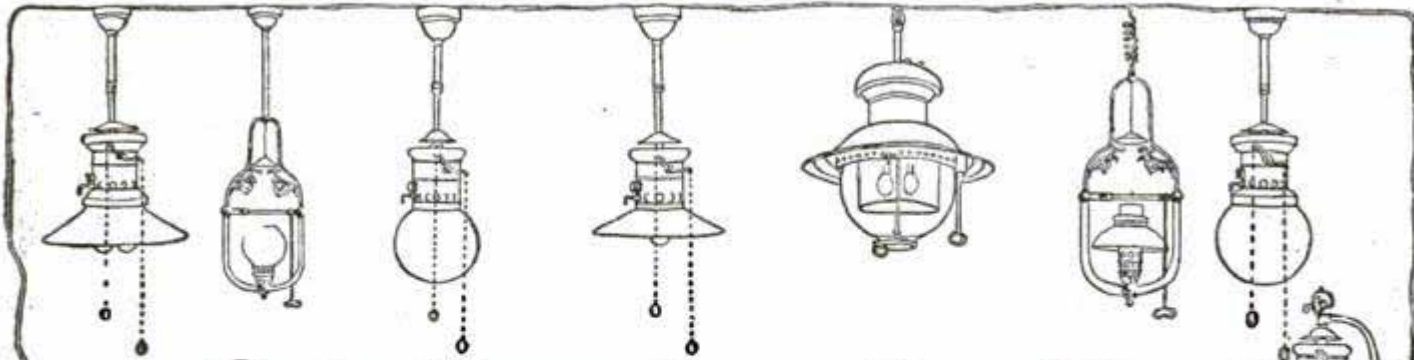
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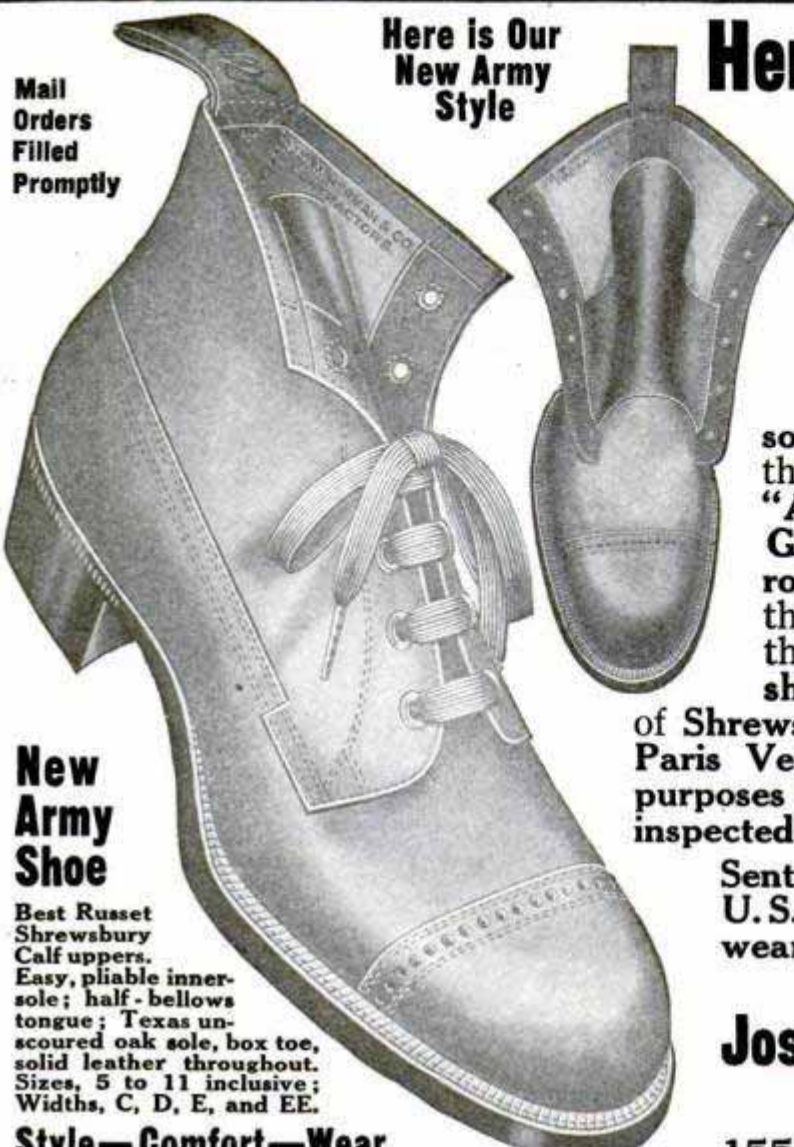
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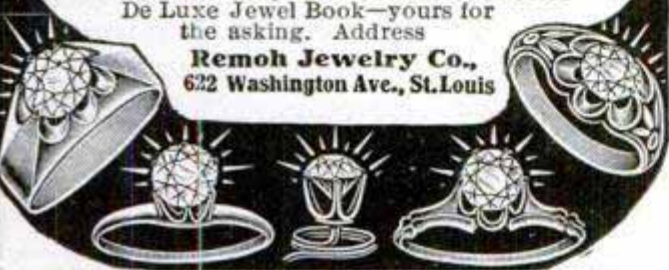
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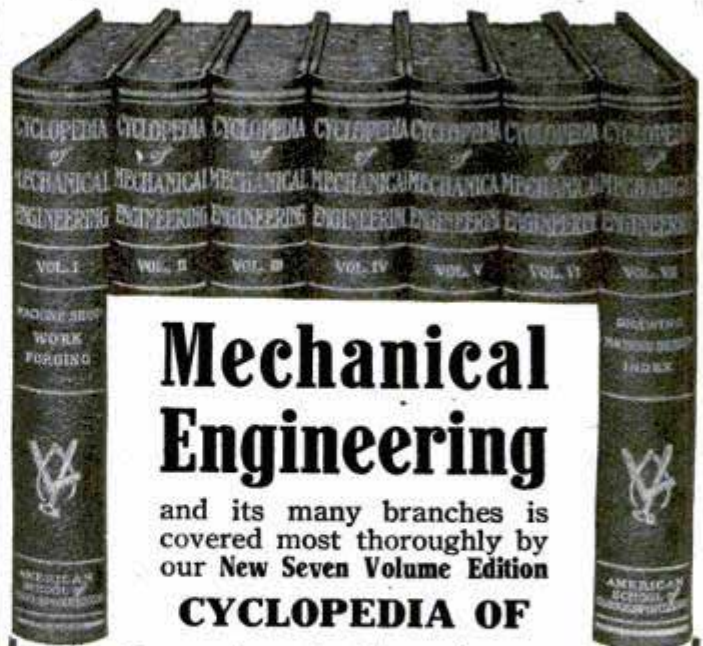
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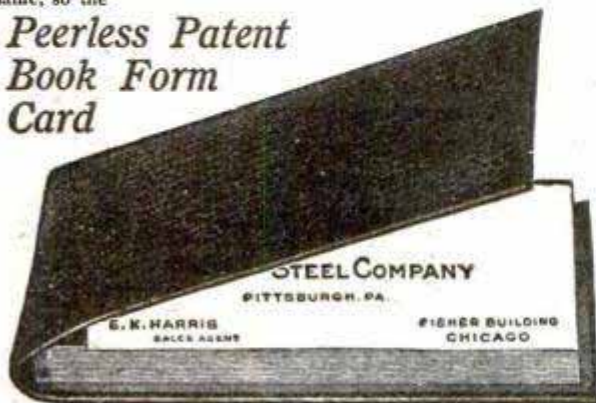
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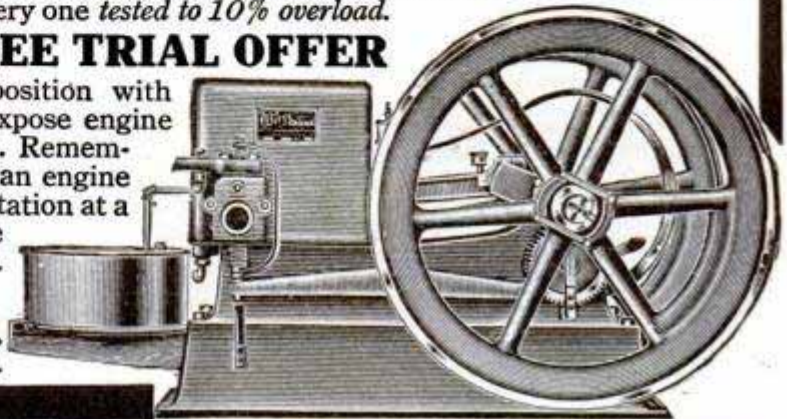
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WRITE AT ONCE

WITTE IRON WORKS CO.
1742 Oakland Ave., Kansas City, Mo.



Every Part
Guaranteed
5 Years

Awake the "Edison"



in your boy by giving him the gift that is as instructive and useful as it is entertaining. Our small engines or power plants are unusually interesting for the mechanically or electrically inclined boy. And they may be profitable, too, in the hands of any

bright boy. One young man is helping pay his college expenses by charging ignition storage batteries with our baby motor. Our engines will furnish power to grind skates, a house lighting dynamo; drive a motor ice boat, canoe, boy's auto, or help mother run the washing machine, cream separator, sewing machine or pump. Start the boy right by getting one of our engines. Ask for catalogue A to-day.

ELGIN WHEEL & ENGINE CO.
ELGIN, ILL.

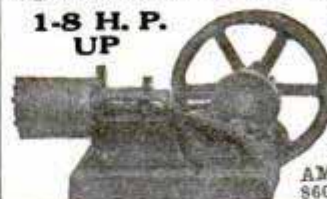


FORCED CIRCULATION WORTHLESS—In a recent article on "What Twenty-Four Years Have Brought Forth," I. C. McChesney, president of the Association of National Advertising Managers, wrote:

"A third important difference between the days of twenty-four years ago and to-day is the methods employed by publications to get larger circulations. Twenty-four years ago ninety-five per cent of the patrons of a paper or magazine were such because, of their own volition, they wanted to be. They sought the pub-

SMALL ENGINES

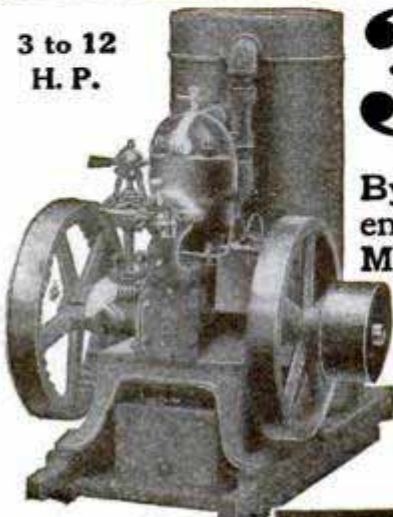
1-8 H. P.
UP



Steam, Gas and Gasoline. For Amateurs and Mechanics. Circulars for Stamp, Big Catalogue Engines, Small Power Machinery and Electric Light Plants, 2 Lights up. Sent for 10c (coin preferred). Refunded first order.

AMATEUR MECHANICS SUPPLY CO.
860 G Monadnock Bldg. CHICAGO

3 to 12
H. P.



34c

**Runs this 6 H. P. Engine for a
10 hour day on KEROSENE**

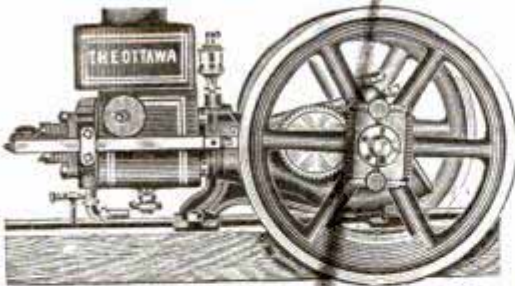
By means of the patent throttle you can run it as a 4 H. P. engine for 23 cents a day, or as a 2 H. P. for 12 cents a day. Many other strong points; force-feed lubrication; uniform speed; sight-feed fuel supply; automobile muffler; no cranking; runs either way; uses any fuel oil satisfactorily. And it's **Guaranteed for 10 Years**. Write for catalogue and 30 days' free trial.

WE PAY THE FREIGHT

ELLIS ENGINE CO., 65 Mullett St., Detroit, Mich.

2 1/4 HORSE POWER

Here's the most reliable farm or shop engine in America.



I absolutely know that it will wear longer and do more work than any other engine of the same size you ever used. That's why we can say to you TAKE IT — USE IT. Send us just one-half of the purchase price or

only **\$24⁷⁵**

and the balance to suit yourself, small monthly payments or a six month's note, just as you like.

No Limit Guarantee! Every OTTAWA ENGINE is guaranteed to be perfect in construction and the greatest value that you can secure for the money. No 60-day or 90-day, or one-year guarantees. No matter when—5 years or 10 years from the time you buy your engine—if it proves defective in any way, we will make it good.

Big 48 Page Catalog FREE!

If you are thinking of buying an engine any size from 1 1/2 to 12 H. P. don't invest a single dollar until you get our prices—the lowest you ever heard of—and our big 48 page 4 color Special Engine Catalog. It will save you from \$20 to \$100 sure. FREE—send for it today.

**GEO. E. LONG, General Manager
OTTAWA MANUFACTURING CO.
946 King Street, OTTAWA, KANSAS**

lication. They did not have it literally crammed down their throats as is so largely the practice today. Twenty-four years ago, if an advertiser could ascertain the exact circulation of a publication, he knew that it represented that number of interested readers—the circulation was ninety-five per cent 'pure.' Today he can learn more accurately about the quantity of circulation, but he knows little about its percentage of purity. He knows that from twenty-five to seventy-five per cent of it has been gained by a forcing process that gets quantity, but

ADD TO YOUR INCOME

The "AMERICAN" KEY-CUTTER is a little wonder, the only machine that cuts keys with angular, square, or round slots; write and we will tell you all about it. Don't forget to ask us about the "AMERICAN" Razor honing and safety blade sharpening machines; they are money-makers.

**AMERICAN SHARPENING MACHINE CO. (Inc.)
Dept. 1 184 W. Washington Street CHICAGO**

Model Aeroplanes

Standard Fittings — Supplies

Second Edition 1912 Catalog "S." A perfect Hand Book on Models. Free on request.

Eight 3 foot Flyers, all original. Curtiss Hydro, (rises from the water). Langley Tandem Monoplane. Nieuport Racer, (very fast). Wright, double chain drive. Antoinette. Bleriot. 1000 foot White Racer. White Flyabout.

The White Aeroplane Co., Wading River, L. I., N. Y.

STOP THE LEAKS

in any household utensil of tin, copper, brass, etc. Send 15c for one ounce tube of **ALLEN PRESTO SODER**

—Its base is Allen — Flux — Standard the world over. Sold by Hardware, Electrical and Auto Supply Dealers; Department Stores, Grocers and Druggists. If your dealer hasn't it send his name and address.

**L. B. ALLEN CO., Inc.
4530 No. Lincoln St. CHICAGO, ILL.**



Fifty Cents a Week Employs These Eight Engineering Experts

50c a week—\$2.00 a month for but one year—will bring to your door a work which contains the condensed knowledge and experience of over a score of Civil Engineers—a work which will give you, without loss of time and at no expense, advice and assistance equal to that of the best experts and consulting engineers. With these books in your office—eight faithful, efficient and tireless assistants—you are prepared to cope with any difficulty, however great, that may arise.

The American School's Cyclopaedia of CIVIL ENGINEERING

is compiled from the instruction papers used in the regular correspondence work of the school; contains 3,900 pages; 3000 illustrations, folding maps, diagrams, etc., with a special cross index for quick reference. The eight large volumes are bound in half morocco and are printed in large, clear type on special quality paper. This great work—a most complete review of Civil Engineering—will solve every problem likely to confront you in your daily work and will place the solution before you so clearly and concisely that you cannot fail to understand and profit by it.

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The complete eight volumes, not a sample volume, will be sent, express prepaid, for seven days' free examination; returnable at our expense if the books do not contain the information you want. If you keep them, pay \$2.00 seven days after receipt and then \$2.00 a month until you have paid the special introductory price of \$24.80. The regular price of this great Cyclopaedia is \$40.00.

Just fill in and mail the coupon. It won't cost you a cent to examine the books. We know they'll be worth many times their cost to you. Mail the coupon now and you'll receive your books promptly.

Some Important Subjects Covered

Drawing, Plane Surveying, Plotting and Topography, Strength of Materials, Masonry, Reinforced Concrete, Hydraulics, Waterways, Water Supply, Irrigation, Water Power, Sanitation, Highway Construction, Steel Construction, Roof Trusses, Practical Problems, Bridge Engineering, Railroad Engineering, Cost Analysis, Harbor and River Improvement.

\$12.00 Consulting Membership Free

With every set is included a year's Consulting Membership, regular value \$12.00, entitling you to the free advice of a staff of Civil Engineering Experts. This will give you practical help in handling working problems which are too specific to be taken up in detail in the Cyclopaedia. There will be no limit to this service. A single problem solved for you might be worth more than the first cost of the books.

American School of Correspondence, Chicago, U. S. A.

FREE OFFER COUPON

American School of Correspondence, Chicago, U. S. A.

Please send Cyclopaedia of Civil Engineering for 7 days' free examination. I will send \$2 within 7 days and \$2 a month until I have paid \$24.80; otherwise I will notify you and hold the books subject to your order. Title not to pass until fully paid. Pop. Mech. 1-13

NAME.....
 ADDRESS.....
 OCCUPATION.....
 EMPLOYER.....



WORK OUT YOUR PLANS IN YOUR OWN SHOP

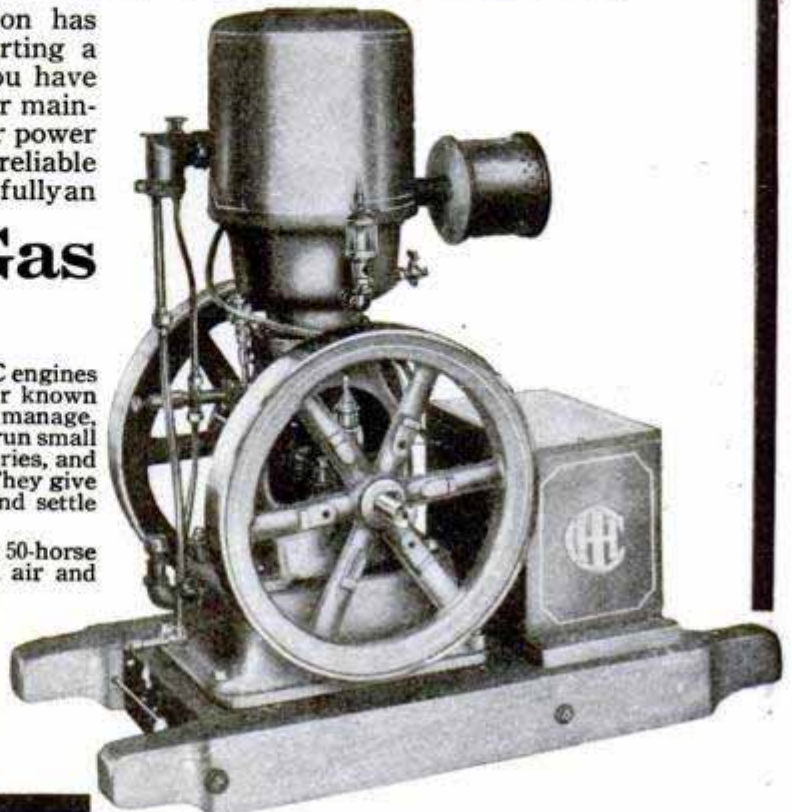
If the power question has prevented you from starting a shop of your own; if you have hesitated because of the cost of equipment or maintenance; if you have paid others a profit for power because you were not sure of getting a reliable engine at a fair price—try again. Consider carefully an

I H C Oil and Gas Engine

Every city is dotted with small shops run by IHC engines whose owners would not trade them for any other known power. They take up little space, are clean, easy to manage, inexpensive to run, durable, and dependable. They run small and large shops. They are used in laundries, bakeries, and many other businesses requiring steady power. They give satisfaction wherever used. Buy an IHC engine, and settle your power problems right.

IHC engines are made in every size, from 1 to 50-horse power, and in every style, horizontal and vertical, air and water-cooled, stationary and portable, to operate on gas, gasoline, kerosene, distillate or alcohol. A post card will bring you a most interesting catalogue.

**International
Harvester Company of America
(Incorporated)**
16 Harvester Building Chicago U S A



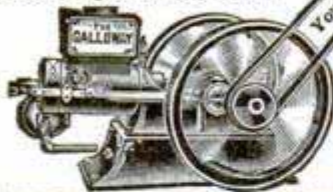
\$50 to \$300 SAVED

We are manufacturers, not merchants. Save dealers', jobbers' and catalog house profit. 10 or more men in every township can save \$50 to \$300 on my High Grade Standard Gasoline Engines from 1 1/2 to 15 H-P, price direct to you lower than dealers or jobbers pay for similar engines in car-load lots for spot cash.

GALLOWAY

Price and quality speak for themselves and you are to be the sole judge. Sell your poorest horse and buy on

30 Days Free Trial



You Can Make From \$5 to \$10 a Day

**Direct
From My
Factory
Satisfaction
or Money Back**

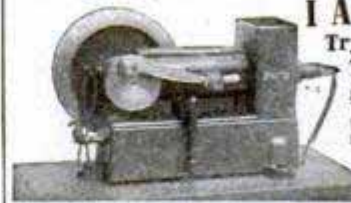
Write for special proposition to 10 or more men. Send for my big **BOOK FREE.**

WM. GALLOWAY, Pres.
WM. GALLOWAY CO.
1965 Galloway Station
WATERLOO, IOWA

of its quality he knows little. He does not know the percentage of interested readers decreases as the quantity increases. The forced circulation is a reversal to the doubtful ethics of twenty-four years ago. Present-day circulations stand in the same position as did much of the advertising of 1888. 'Let the buyer beware' applies just as much to the artificial circulation of today as it did to a great part of the advertising of twenty-four years ago. The science of getting people to take publications they don't want, don't need and don't read

I Am Yours for \$1950

Try me for 10 days



This is our 1-2 horse power Gasoline Engine fully equipped. Switch, Coil, Spark Plug, Gasoline Tank, Mixing Valve all ready to run. Fully Guaranteed. Return if not satisfactory and money refunded. Will run Washing Machines, Cream Separators, Butter Churns, or any light machinery where small power is required.

SIEVERKROPP ENGINE CO., 1224 18th St., Racine, Wis., U. S. A.

This Extraordinary Engine

Single and Double Cylinders — Burns Gasoline, Kerosene, Gas or Distillate — Simplest, Most Powerful, Reliable and Economical Engine Made. All Sizes, 1 1/2 to 50 H. P. We Will Trust You.



**Saves
1/2
Fuel
2/3
Weight
Gives
Most
Power**

The Only Engine that Has Solved the Problem of Violent Vibration

This is the famous TEMPLE which stands on its feet — the up-to-date *Economical Engine* that has won every prize contest against well known makes. *Practically no vibration!* Explosions take place low down close to the ground which absorbs and does away with the shock and strain on the engine. In every other engine explosions occur high up, causing violent vibrations that reduce life of engine. Crank Shaft over Cylinder secures perfect lubrication by gravity. No other engine has this! "TEMPLE," alone, has downward lubrication — hence *less friction and greater power from every pint of fuel!*

30 Days' Free Trial—Easy Terms

Don't buy an Engine until you have investigated the "TEMPLE." Most powerful, economical, reliable, easiest starting, strongest engine built. Prove these claims by 30 days' free trial test. Your credit is good.

Write today for Big Special Offer and Full Particulars

THE TEMPLE PUMP CO. (60 Years in Business) 102 Meagher St., Chicago, Ill.

YOU CAN TEST IT 30 DAYS FREE

Fairbanks-Morse Eclipse Engines

Handy, Reliable, Powerful

Pump water, run churn, cream separator, ice cream freezer, printing press, linotype machine, etc. A pint of gasoline will run the No. 1 Eclipse Engine an hour and will pump 3000 gallons of water.

Eclipse engines are as simple as is possible to make a practical, powerful engine. Manufactured in our immense factory on latest automatic machines. All parts absolutely interchangeable. Large, dust proof bearings. Thorough lubrication. Valve operating mechanism and ignition timing device remarkably simple. Fully guaranteed.

The No. 2 Eclipse is a larger engine and is recommended for deep well pumping, wood sawing, feed grinding, etc.

Write for Catalog No. 449WI

Fairbanks, Morse & Co.
900 S. Wabash Ave., Chicago, Ill.

Fairbanks Scales, Oil and Gasoline Engines, Oil Traction Engines, Pumps, Water Systems, Electric Light Plants, Wind Mills, Feed Grinders.

No. 1 Eclipse Engine attached to ordinary wind mill pump.



has developed a condition that may be likened to the sunflower in the rankness of its growth and the fragrance of its flower."

London has more than 900,000 partially or wholly deaf residents.

GRAY MOTORS FOR BOATS

Made in the Largest Plant in the World devoted to manufacturing 2-cycle marine gasoline engines.

3 H.P. with Complete Outfit ready to install \$55
ALSO 3 1/2 TO 36 H.P.

Guaranteed by a big responsible concern. Write for big catalog—tells and shows you all about these high grade motors and how they are made.

GRAY MOTOR CO., 198 G. M. C. Bldg., DETROIT, MICH.

Use Kerosene Engine Free

The "Columbia" Kerosene Engine shipped on 15 days' FREE Trial, proves kerosene cheapest, safest, most powerful fuel. If satisfied, pay lowest price ever given on reliable farm engine; if not, pay nothing. No waste, no evaporation, no explosion from coal oil.

GASOLINE GOING UP!

Gasoline is 9c to 15c higher than coal oil. Still going up. Two pints of coal oil do work of three pints gasoline.

"COLUMBIA"

SIZES 2 to 16 H. P.

— only engine running on coal oil successfully; uses alcohol, gasoline and benzine, too. Starts without cranking. Only three moving parts—no cams—no sprockets—no gears—no valves—the utmost in simplicity, power and strength. Mounted on skids. All sizes, 2 to 20 h. p., in stock ready to ship. Engine tested before crating. Comes all ready to run. Pumps, saws, thrashes, churns, separates milk, grinds feed, shells corn, runs home electric lighting plant. Prices (stripped), \$29.50 up. Sent any place on 15 days' Free Trial. Don't buy an engine until you investigate money-saving, power-saving "COLUMBIA." Thousands in use. Costs only postal to find out. If you are first in your neighborhood to write, you get special extra low introductory price. Write!



COLUMBIA ENGINE CO., 547 Bellevue Ave., DETROIT, MICH.



Use This Camera 10 Days FREE

Do not send us a penny, merely send your name, address and nearest express office on coupon below, and the genuine No. 9 Folding Ansco, the camera with a national reputation, will be sent to you *express prepaid*. Try it for ten days, see how splendidly it works, note the high grade rapid symmetrical lens, Cyko automatic shutter, brilliant reversible finder that works either horizontally or vertically, two tripod sockets, and improved spool holder—for either six or ten exposure films. This is an ideal camera, high grade, post card size—3 1/4 x 5 1/2; use it for pleasure or profit; take pictures for making money, or take pictures for fun or study. It is a great pastime and a liberal education.

If at the end of ten days, you find that it's just the camera you want, send us \$2.00, and thereafter \$2.00 a month for nine months—\$20.00 in all. If you do not want it, simply return the camera at our expense. You take no risk.

This is the Greatest Camera Offer Ever Made in America

This celebrated Ansco No. 9 Folding Camera sells for \$20.00 cash everywhere in the world, that's the standard price—we offer it to you at the same price on the easy-payment plan, only \$2.00 a month. This is the first time you have ever had the opportunity to buy a standard high grade camera on the easy-payment plan.

Special Film Offer You will need one or more rolls of film to try out this camera, and we are making a special offer: Send us 50c and we will send you a roll of films that will take 6 pictures; after you have taken the pictures, send the roll to us and we will develop and print them and send them to you without any additional charge.

National Camera Company
301 Liggett Bldg. St. Louis, Mo.

Fill Out This Coupon Today and try the wonderful Ansco No. 9, for 10 days, free. We will send it to you prepaid. You take no risk at all.

Send me for ten days free trial Ansco No. 9 Camera. If I am satisfied with it, I will send you \$2.00 as first payment, and then \$2.00 per month for nine months.

If I do not wish to keep the camera, I will return it to you within ten days at your expense. (I enclose 50c for your special film offer).

National Camera Company
301 Liggett Bldg. St. Louis Mo.

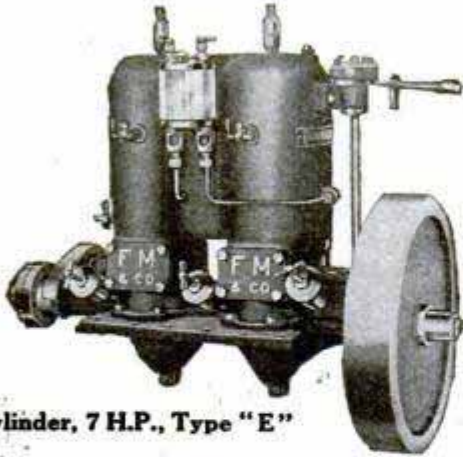
NAME

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EXPRESS OFFICE.....

Please Mention Popular Mechanics

Fairbanks-Morse Marine Engines



Two Cylinder, 7 H.P., Type "E"

Reliable—Economical—Efficient

The perfected result of over thirty years of engine-building experience. Designed and built for hard service. Meet all requirements.

Start easily without cranking. Develop more than rated power and can be depended upon whenever you want service. All parts easily accessible and all interchangeable. Three types.

High Speed Engines 3 1/2 to 24 H. P. Low Speed Engines 7 1/2 and 15 H. P. Catalogue No. CV449 describes them. Write for it.

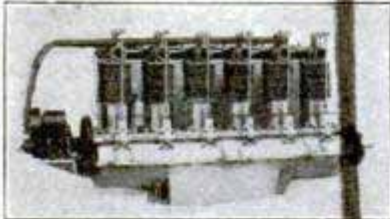
Agents Wanted

Fairbanks, Morse & Co.

900 So. Wabash Ave., Chicago, Ill.

The Canadian Fairbanks-Morse Co., Limited, Agents for Canada
St. John, N. B., Montreal, Toronto

THE ONLY AIR-COOLED VERTICAL AEROPLANE MOTOR MANUFACTURED IN AMERICA

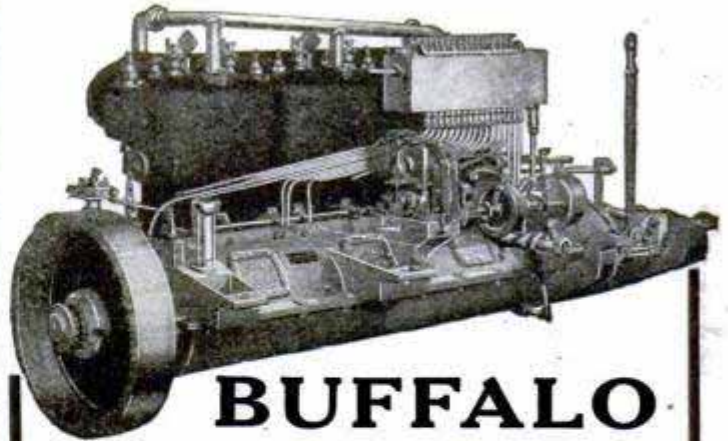


The Kemp Air-Cooled, the most efficient and reliable motors, are built by the best skilled mechanics, only the best materials and equipments being used; guaranteed to give absolute satisfaction; are light and strong, one of the

first steps considered by Aeronauts. The simplicity and ease of adjustment is another great factor; they contain longer bearings and less parts than any other aeronautical motor manufactured; have no radiator, therefore no radiator head resistance, no pump, no water; an economical fuel saver, easy to start and control; can be mounted on any plane with ease. Send for our catalogue and most liberal prices before buying elsewhere.

KEMP MACHINE WORKS MUNCIE, INDIANA U. S. A.

WHEN YOU WANT ANYTHING AND DON'T KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO



BUFFALO MARINE ENGINES

are all of the four stroke type, slow speed, medium speed, high speed—3 to 125 H. P.

They Excel in Reliability

The Buffalo Book tells the whole story. If you want it, send us your name and address.

The Engine of Constant Service.

PACIFIC COAST AGENTS:

San Francisco—Buffalo Gasolene Motor Co., Jas. B. Blair, Mgr.
Seattle—Woodhouse Gasolene Engine Co., 62 Marion Street.
Vancouver, B. C.—Vancouver Ship Yard, Ltd.
Victoria—G. Harold Grant, Grants Wharf, Ellice Point.

Buffalo Gasolene Motor Co.
1293-1305 Niagara Street, Buffalo, N. Y.

To prevent the starched bosom of a dress shirt climbing out over a low cut vest an inventor has brought out a shirt that is combined with a pair of short drawers.

Get This Power Boat at Maker's Prices

BUY DIRECT FROM MANUFACTURER AND SAVE DEALERS' PROFITS



This Toppan Power Dory as illustrated above is made of best guaranteed materials and is the standard rough water boat of the

world. Safe and reliable—used by U.S. Government in all departments. Send 4c in stamps for catalogue. Ask for prices and facts about Toppan Reversible Motors, built with 2, 3, 5, 8 and 12 Horse Power—and if you want to build your own dory, saving exactly HALF, ask for **TOPPAN BOAT MFG. CO. FREE KNOCK-DOWN BOAT QUOTATIONS.** 3 Haverhill St. BOSTON, MASS.

PALMER MOTORS AND LAUNCHES

Ask for free Engine or Boat Catalog. Address Dept. K
Engines, 2 to 40 H.P., 2 & 4 cycle, always in stock

PALMER BROS., Cos Cob, Conn.



On or Off in Five Minutes

Makes a Motor Boat of ANY Boat
AND also "makes good" on shore

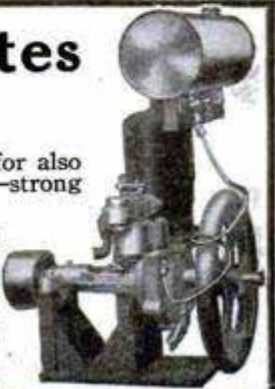
Here is the famous original Portable marine motor, now adapted for also running a hundred different small machines ashore. Simple—light—strong
—SOLD ON THIRTY DAYS TRIAL.—Money back if you say.

"PORTO" the Marine and Stationary Engine Combined—TWO MOTORS IN ONE

A reliable 2 h. p. motor that will drive an 18 ft. rowboat 7 miles per hour for 4 hours on a gallon of gasoline, or in five minutes can be mounted for use in shop, laundry, barn, or any other place desired. Write Quick for new "Two-in-one" catalog, mailed free. Orders filled in order of receipt. Don't delay.

WATERMAN MARINE MOTOR CO.

1507 Fort St., W., DETROIT, MICH.



THE SCRIPPS COMPLETE MARINE POWER PLANT

On September 12th the 35 foot motor boat "Detroit," equipped with a 16 horse power, two cylinder

Scripps engine, completed its 7000 mile voyage from Detroit to St. Petersburg, successfully accomplishing a feat unequalled in the history of motor boating. Crossing the Atlantic, the "Detroit" averaged 6 miles an hour, the motor turning over approximately 480 revolutions a minute: traveling from New York to Queenstown in 21 days and 16 hours. No marine motor has ever before been given such a strenuous test. Some idea of the work done will be gained when it is stated that the motor made a total of 28,799,960 revolutions and each piston traveled over 5453 miles. The power plant used was a regular stock model. SCRIPPS MOTOR COMPANY, 650 Lincoln Ave. Detroit, Mich.

Scripps motors are carried in stock in New York by Bowler, Holmes & Hecker Co., 142 Liberty St., N. Y. In Boston by Walter H. Moreton, 218 State St., Boston, Mass.



THE POWER OF WATER—A sure-thing wager sprung on curious visitors by the engineers of some of the big water-power projects of the far west is that a 200-lb. man, swinging a 4-lb. ax with all his might, cannot make a dent in the water as it emerges from the nozzle at the power house. Burying an ax in a stream of water looks like child's play, and the average 200-lb. visitor is likely to bite. He invariably loses. So great is the velocity of the water emerging from the nozzle in these up-to-date power plants that an

WATKINS' SPECIAL MOTORS

3 H. P. Single Cylinder . . . 30 lbs.
6 H. P. Double Cylinder . . . 60 lbs.
12 H. P. Four Cylinder . . . 100 lbs.
A strictly HIGH GRADE Motor that will give CONSTANT and EFFICIENT service. Especially adapted for CANOES and LIGHT BOATS. Aluminum base, copper water jacket, steel shaft, bronze bearings.

THE WATKINS MOTOR CO.
837-839 West Sixth Street CINCINNATI, OHIO

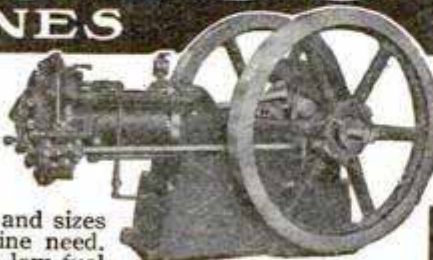


"INGECO" ENGINES

1 1/2 to 350 H. P.
Gas, Gasoline,
Oil and
Producer Gas

Includes all types and sizes to meet every engine need. Simple to operate—low fuel cost—substantial construction. Perfectly balanced, smooth, steady, reliable. Sales branches and stocks everywhere. If you expect to buy an engine our expert will tell you what is best and cheapest for you.

INTERNATIONAL GAS ENGINE CO.,
116 Hellhoff Pl., CUDAHY, WIS. (Suburb of Milwaukee)



Deaf People Now HEAR

Distinctly!
Clearly!
Perfectly!



In The Hollow of Your Hand

every kind of sound with the aid of the latest marvelous invention, the remarkable

New 4-Tone Mears Ear Phone

The great, new electrical marvel for the deaf. Perfect hearing at last! This remarkable invention has four different sound strengths, four different adjustments, instantly changed by a touch of the finger. You regulate the instrument by a tiny switch to meet any condition of your ear or to hear any sound—low pitched conversation near you or sounds from any distance. The whole range of hearing of the healthy, natural ear is covered by this new 4-Tone Special Model Mears Ear Phone.

Special Limited Offer

Write at once for our Sensational Introductory Offer on this new wonder. To advertise and quickly introduce this greatest of all inventions for the deaf, we are going to sell the first lot of these new four-tone phones DIRECT from our laboratory to users at the confidential jobber's price. This offer applies only to the first lot finished—a limited number. Write today—send the coupon—and you can save more than one-half the retail price. A few dollars, payable on easy terms, if desired, secures you complete relief from your affliction. But the jobber's price is confidential. You must write for it. Do it now and save both wholesaler's and retailer's profits.

Try it 10 Days in Your Own Home FREE

Every Mears Ear Phone is sold only on Free Trial. Ask about our great free trial offer. Test this amazing instrument on your own ears, under any conditions of service for ten days. Nothing to pay for the trial. The Mears Ear Phone is the only scientific and perfect hearing device for the deaf. Already 14,000 Single Tone Mears Ear Phones have been sold.

Send Coupon Now For Free Book

The Mears Ear Phone book explains all the causes of deafness; tells how to stop the progress of the malady and how to treat it. Send the coupon at once for Free Book and our great Confidential Introductory Offer. Send at once.

COUPON

Mears Ear Phone Co. Suite 813

45 W. 34th Street New York, N. Y.

Gentlemen: Please mail me, free and post-paid, your Mears Ear Phone Booklet and particulars of your Special Introductory Offer on your new model Four-Tone Mears Ear Phone and Free Trial Offer.

Mears Ear Phone Co., Suite 813
45 W. 34th Street
New York, N. Y.

Name.....
Address.....

1913 CAILLE Here's the Achievement of a
PERFECTION Mechanical Ideal,
 the success of which
 guarantees an Efficient
 motor boat, in that it permits
 the conservation of your motive power.

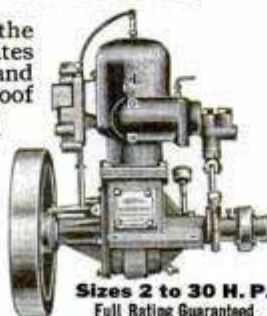
Power when and where you want it—real full rated horsepower harnessed into one complete, accurately balanced power unit—straight line drive transmission system and a drive shaft that is all twist, all energy, all leak-proof—that's the Caille Perfection Marine Engine for 1913. A triumph of engineering skill that has excited the wonder and admiration of the entire engineering profession.

This Engine 100% Right The Sensation of 1912

The Caille Perfection Igniter was the sensation of 1912. The Igniter obviates the use of magneto, timer, batteries and coils and insures you a trouble-proof engine. This Igniter equipment is embodied in the 1913 Caille—why not get the free catalog for complete details and description.

Send for Our 1913 Catalog Today

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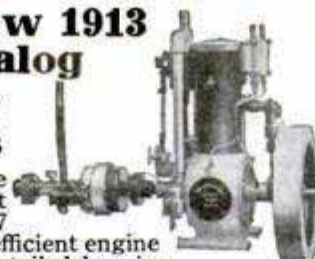
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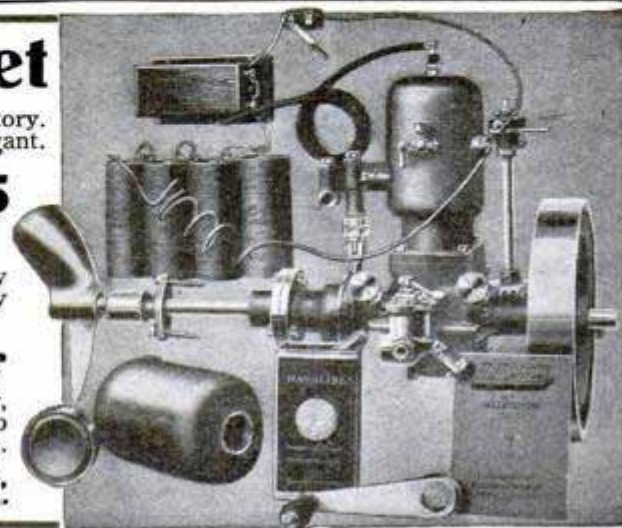
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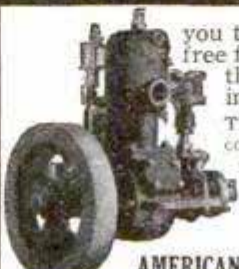
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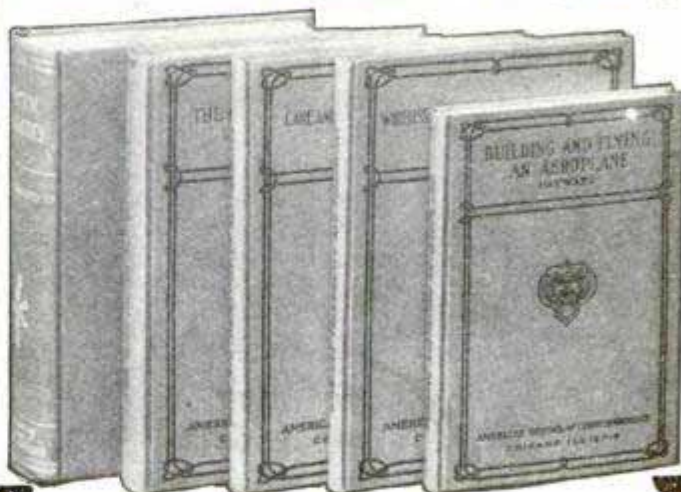
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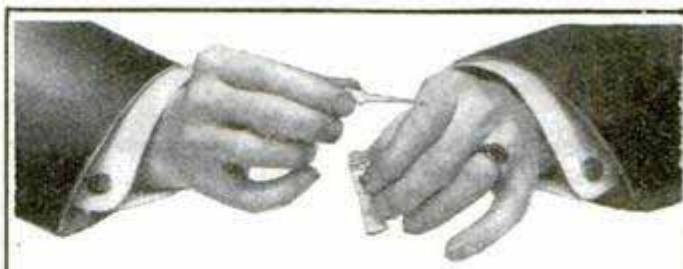


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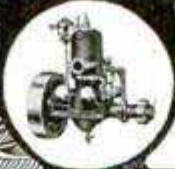
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I've a Big New Proposition To Make You, Man to Man

I Want to Start You in The Same Business That Made Me Wealthy — W. Z. Long



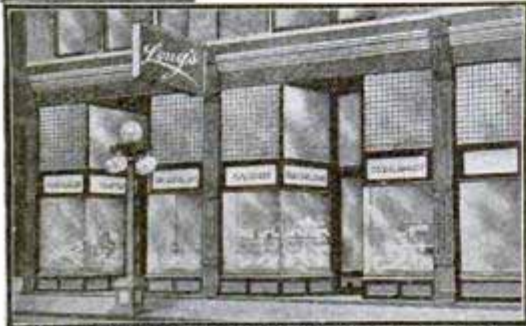
I want you to come to see me at my expense. I want to meet you face to face and show you the wonderful possibilities in the business. Once I was a struggling candy maker. Profits from Crispettes, the wonderful, new, delicious popcorn confection, made with my Crispette Machine, built a big business for me. I want to start you the same way I started. Long winter months are ahead. Don't slave them away for someone else. Start a business of your own — be independent. I'll teach you how to start — show you how to make Crispettes by my special secret formula — personally or by mail. But I repeat — I want you to



This is a recent picture of the man who made \$1500 in one month with a Long Crispette machine, in a store window.

Come To See Me At My Expense

Learn all about the proposition. I'll show you records that will thrill and inspire you. I'll read you letters from users of my machine that will take your breath away. You'll see that what I say is true. Don't say you're coming. Drop in quietly. Call on any banker or merchant. Ask them about Long — about my store — my crispette business. Ask them if what I say isn't the truth — right from the shoulder. Look into my reputation. See if folks think I'll give you a square deal. Then come and see my store — see that it's just like the picture in this advertisement. See the machine. See crispettes made — make a batch yourself. Learn the business. Get my pointers on how to succeed. Up to a distance of 300 miles I'll pay all your traveling expenses, if you buy a machine. You'll see, know — learn everything. It's simple — easy. Won't take you a day. I'll be glad to see you — glad to show you the store and have a good talk with you. You'll go home ready to make more money than you ever made in your life.



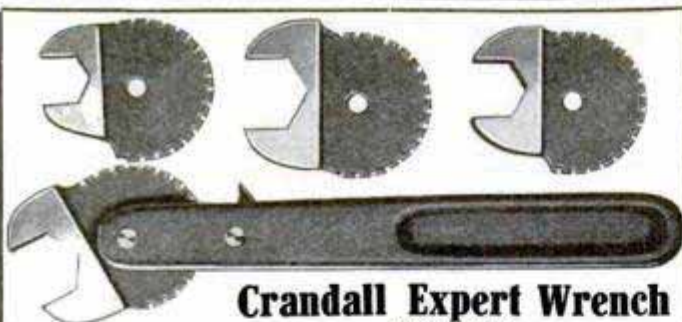
A Picture of My Big Store in Springfield

Every Nickel You Take in Nets You Almost Four Cents Profit

Think of it! Think of the fortunes made in 5 cent pieces. It's one business in a hundred. Everybody likes crispettes. One sale always means two — two means four. So it goes. It's a great business. I found it so — so should you.

FREE My book "How to Make Money in the Crispette Business" — 48 pages illustrated — complete information and story of how I built my business. Write for it today. Read it and then come to Springfield.

W. Z. Long, 700 High St., Springfield, O.



Crandall Expert Wrench (PATENTED)

Here is the wrench you have been waiting for. Goes into all the close and difficult places. Ratchet can be worked in one inch of space. Does what 56 solid wrenches can't do. Changes jaw sizes in 5 seconds without extra tools. Drop forged steel and case hardened. 4 sizes jaws and handle in neat duck case, only \$2.50 the set, at your dealer's or sent direct, charges paid on receipt of price.

Ask for descriptive circulars. Live salesmen wanted
EXPERT UTILITY CO., 224 E. 4th Ave., Cincinnati, O.

pairs of shoes with a manufacturing concern in Boston. This is about the first order for shoes for Baku placed directly with manufacturers in the United States.

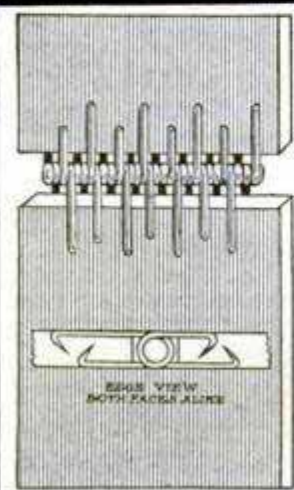
American-made shoes will have to compete in the Baku market with "American shoes" made in Germany, which follow closely the style of last made in the United States. "American shoe" is a style with the German shoe manufacturer, and the shoe displayed in the shops is accompanied by an American flag, also of German manufacture.

It is probable no attempt is made by the German

New Waljar Pipe \$1

Durable, simple; cleaned in a jiffy. Always a cool, sweet smoke. Has Genuine Briar Bowl, with Sterling Silver Ferrule, Patent Hard Rubber Mouthpiece, and with German Silver Cleaning Spoon.

FREE This heavily nickel-plated Pipe Lighter, with pocket clip, strikes like a match. **Good Live Agents Wanted**
WINSOR SUPPLY BROS., 7251 Bond Ave., Chicago



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For high speed and over-and-under belts
Beaten in with a hammer

- No. 5** Box contains 1000 double hooks in sections of 1 in., 1½ in., and 2 in. for one-ply leather belts; makes 12 feet **\$1.75**
- No. 6** Box contains 1000 double hooks in sections of 2 in., 2½ in., and 3 in. for two-ply leather belts; makes 13 feet **\$2.00**
- No. 7** Box contains 1000 double hooks in sections of 2½ in., 3 in., and 4 in. for heavy two-ply leather belts; makes 15 ft. **\$2.25**

A multiple of any of the above sections are used for any width of belt.

Sent by **PARCELS POST** in U. S. on receipt of price

WEBB HINGE BELT HOOK CO.
BOONTON, NEW JERSEY



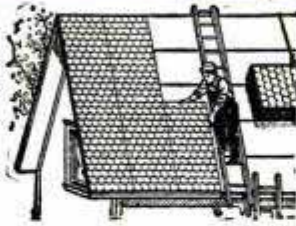
Come in riveted sections ready for instant use



By turning each alternate hook back

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If you only *knew* how *cheaply*, *quickly* and *easily* you can roof your buildings with genuine Edwards STEEL Shingles, you wouldn't fool with any more prepared roofing or inflammable wood shingles.



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Don't you know Edwards uses a secret process which absolutely prevents rust from ever getting a foothold; that Edwards has patented an Interlocking Device which makes a permanent water-tight joint? Don't you know Edwards uses only the finest open-hearth steel for his shingles; that Edwards Galvanized STEEL Shingles never need painting nor repairs? Don't you know that Edwards gives every buyer a signed \$10,000 guaranty against fire by lightning; that Edwards STEEL Shingles not only make the most handsome roof but outlast THREE wood-shingle roofs and FIVE prepared-paper roofs?

Well, then—why don't you write Edwards a postal this minute and get by return mail his latest catalog 150 and astounding factory prices? If you'll give the SIZE of your roof, Edwards will make you a lump price on the job. Get Edwards PATENTS at once. (86)

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manufacturer to pass his "American shoe" off as an American-made shoe. There is noticeable, however, a frequent confusion of the terms in the mind of the average retailer and a greater confusion in the mind of the ultimate consumer. Shoes of American shapes made in Russia are also sold.—Philadelphia Record.

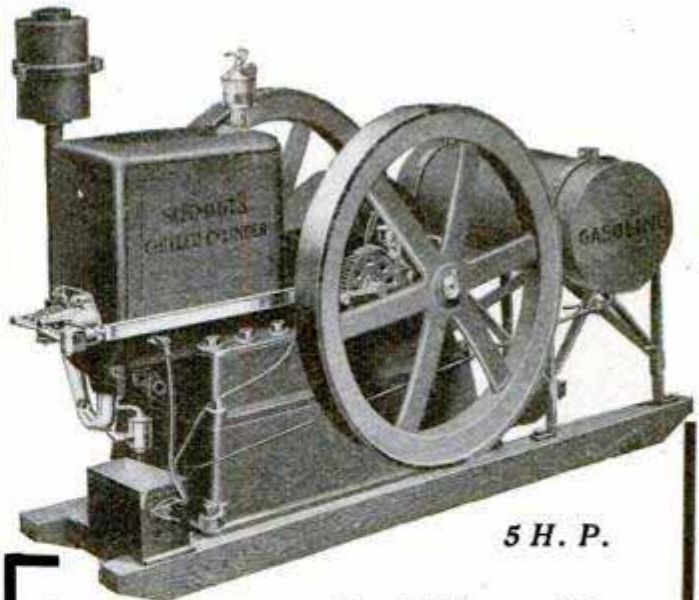
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5 H. P.

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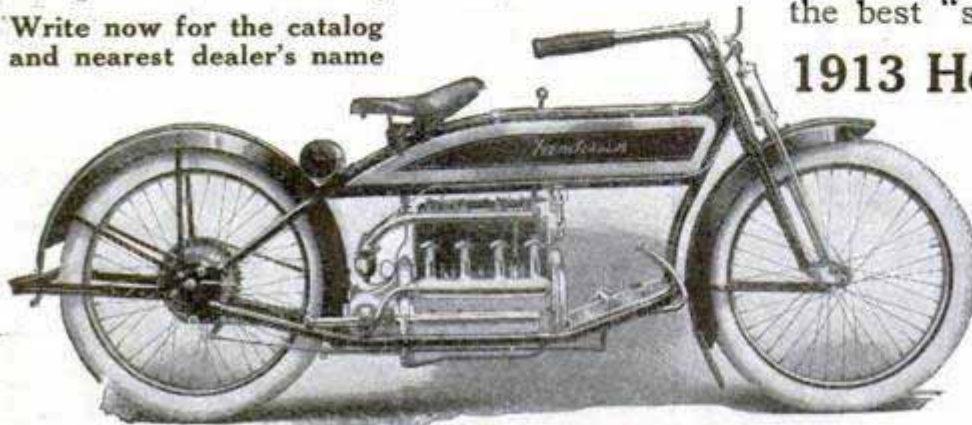
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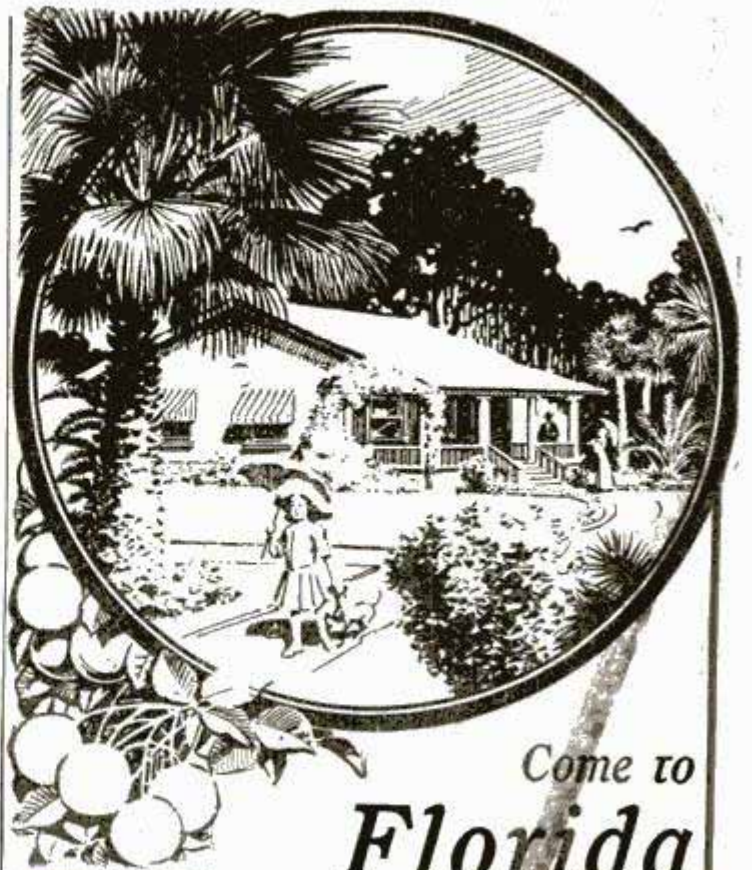
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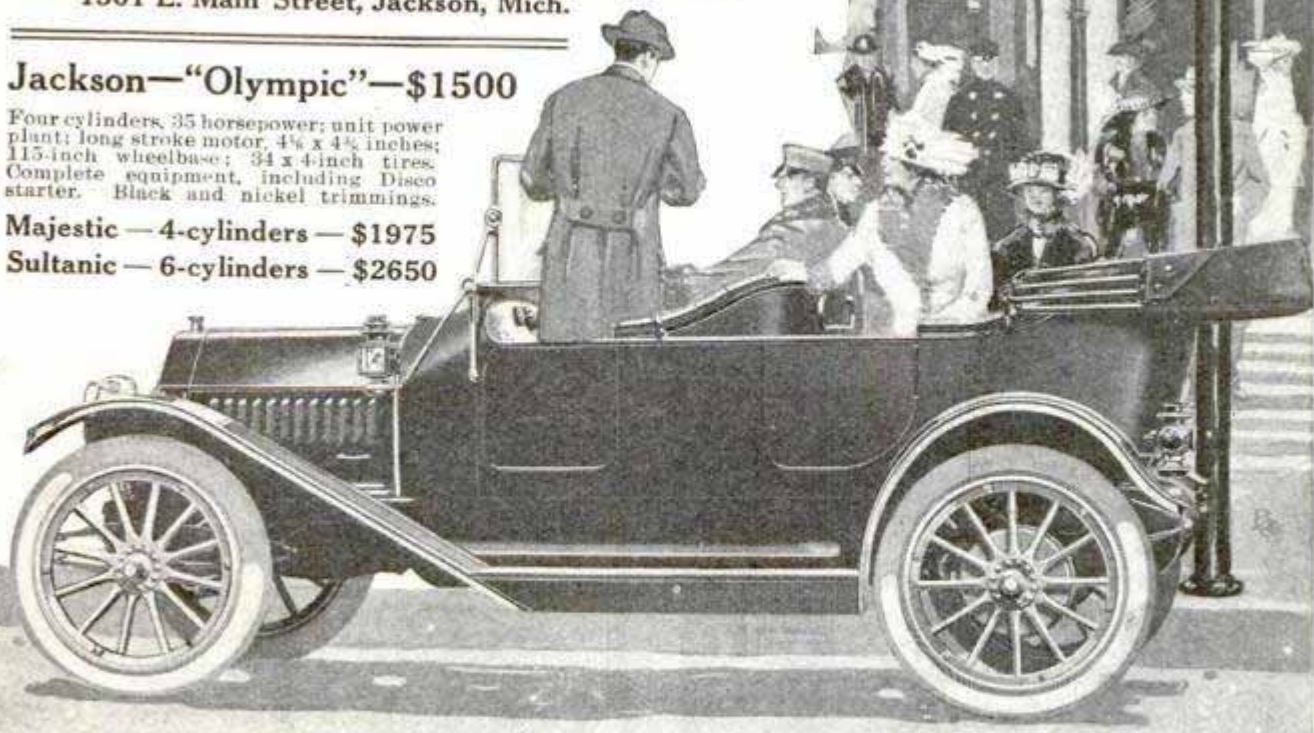
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INVESTIGATE AND BE AMAZED Demand absolute proof—accept no other kind. Either we have the best thing that ever happened or we're colossal liars. Ask Schleicher, minister, whether it's true that he received

\$195 TWELVE HOURS AFTER APPOINTMENT;

Langley, liveryman, \$115 first day; Rasp, agent, \$1685 in 73 days; Beem, solicitor, \$164.25 weekly for 12 weeks; Korstad, farmer, \$2212 in a few weeks; Zimmerman, farmer, \$3856 in 30 days; Stoneman, photographer, \$3841 in 60 days; Juell, clerk, \$6800; Hart, farmer, \$5000; Wilson, cashier, \$3000 in 30 days. Let us refer you to these men, to the U. S. government, to banks, business houses, noted people at home and abroad. Heed this caution from Chas. Starr, of Mich., who writes: "Sorry this field is closed. Should have acted sooner but was skeptical. Your local man's great success has set everybody talking and proves I was a chump. Wonderful what a man can do with a real opportunity." Then read this from Lodewick who acted quickly: "Lucky I answered ad. It's great. Money coming fast." Which will you be, Starr, a victim of "neglected opportunities," or Lodewick, the "early worm." To escape Starr's fate, send your postal this very minute—

SPEND ONE CENT TO MAKE THOUSANDS

Ever hear of Allen's Wonderful Bath Apparatus? If not, listen. Gives every home that long-desired blessing, a modern bathroom with hot and cold running water facilities for only \$6.50. No plumbing—no water works—self-heating. Only ten minutes to install. Gives cleansing plus friction, massage and shower bath in any room. Equivalent to any \$200 bathroom. Over 200,000 delighted users. Used by U. S. government.

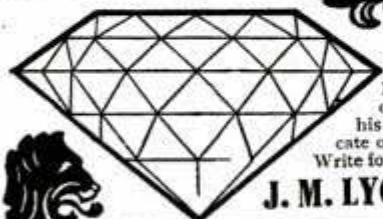
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"Ring Out the Old; Ring In the New. Ring Out the False; Ring in the True." It Rings in Your Ears, and Well it May. Tennyson never Wrote a More Beautiful Poem, and You never Read a More Helpful One. Read It Over Again. Every Man should Strike a Balance on New Year's Morning, even Though He May Have Been a little Off his Balance New Year's Eve. It's Easy to Turn Over a New Leaf, but It Takes a Real Man to Keep it Turned. "Eternal Vigilance" is the Price, not Only of Liberty, but of Habits, Health and Happiness — Now and Hereafter. Good RESOLUTIONS will Become REALIZATIONS only when Backed up By PERSISTENT PURPOSE.

How about Your Balance Sheet for 1912? Haven't You charged off a Lot of Things to "PROFIT and LOSS" that Ought to Be On the Credit Side of the Ledger? Haven't You Frittered away a Great Deal of Your Hard Earned Cash for Petty Pleasures, or Lavish Luxuries, when You Could Have Laid By Something for the Inevitable "RAINY DAY?" How Much Better Off are You than Last Year, or the Year before That? True, You have "Kept the Wolf from the Door," but by a Little Economy and Self-Denial You Might have Begun the Erection of a Fortification that would Forever Free your Family From Fear of Its Ferocious Fangs.

Your Good Job may not Always Last. Some of These Days a Younger Man May Fill Your Place. I said a "Younger," not a **Better** Man. The Gray is Creeping into Your Hair, and the BOSS is Likely to Forget the Splendid Things You Did—Once Upon a Time. "Yo' Ben a Good Old Wagon, But Yo' Dun Broke Down." The World Wants a WINNER, and Won't Worry Along With Wornout Workers.

"Parted From the Pay Roll" is a Little Drama in which You may Expect to Play the Principal Part Some Sad Saturday, P. M. Then the "Good Fellows" who Helped You Spend your Money Will Likely Pass By on the Other Side, and the Only Place You can Look for **Sympathy** will be In the Dictionary.

Let US, therefore, "Ring Out False Pride," and Hereby Firmly Resolve to Establish a New Record for 1913, which Will Enable You to FACE the FUTURE FEARLESSLY. Strikes, Lock-outs, Panics and Periods of Financial Depression

Cannot Depress You, if You Will Make It a Rule to Save a Little Something Every Day. Again I Repeat It—**Saving** is the Antidote for Slaving.

The Best Incentive to Persistent and Systematic Saving is the Desire to Get a Home. The Best Place I Know of to Get a Home is in the Rain Belt of Gulf Coast Texas, where You can Grow Three Big Money-Making Crops a Year, and where Irrigation and Fertilization do Not Eat Up the Profits Your Hands Create.

I believe you could save Twenty-five Cents a Day if You tried. I know you would Try if you Realized that our Growers of Figs, Strawberries and Early Vegetables clear a net profit of \$300 to \$500 an Acre. Men have Realized more than \$1,000 an Acre growing Oranges in our Country. Remember that our Early Vegetables get to Northern Markets in Mid-Winter and Early Spring, when they command Top Prices.

One German Truck Grower on adjoining lands this spring realized nearly \$500 from three-fourths of an acre of Strawberries. You could do as well if you only Tried, and on a Ten-Acre Tract **Find Financial Freedom.**

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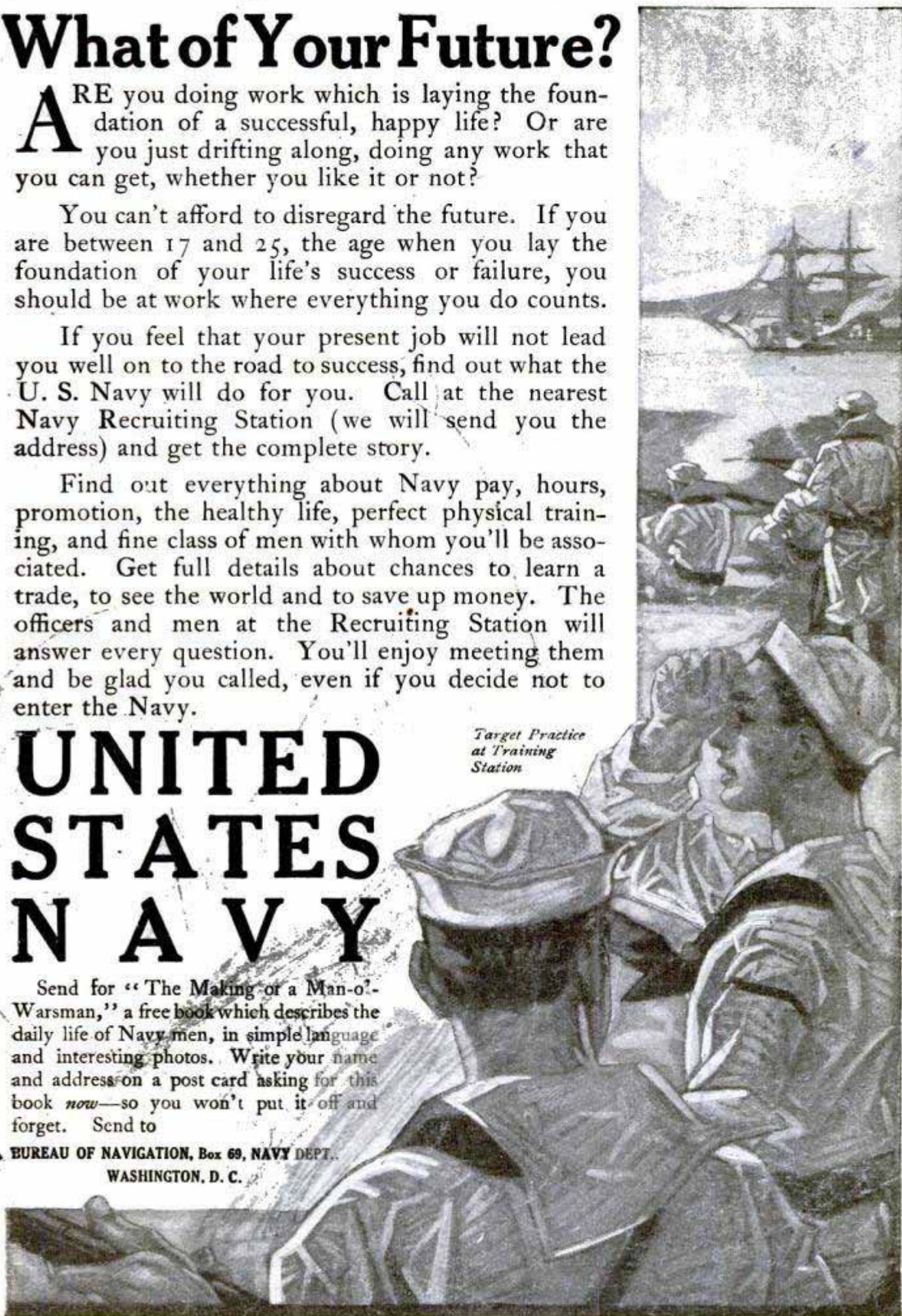
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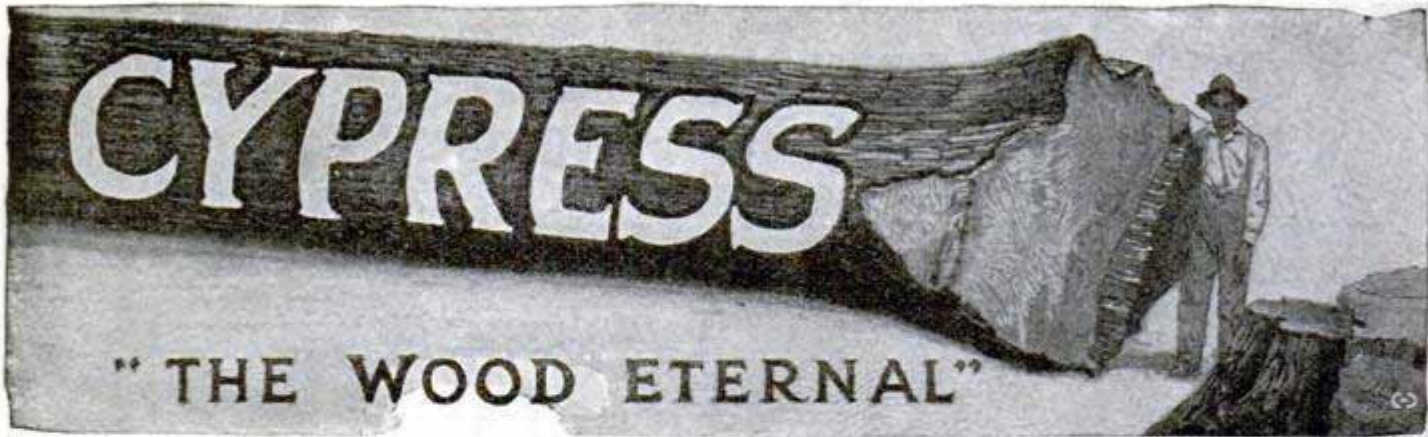
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Contents for February, 1913

Diving Motor Car for Deep-Sea Divers.....	155	The Sand-Clay Roads of North Carolina.....	192
Auto Stage Has Smoking and Baggage Rooms.....	156	Comment and Review.....	193
Looking Down on the Fire-Control Squad.....	157	By H. H. Windsor	
Aviettes Growing Up from Bicycle Models.....	158	Massive Legs of Statue of Norwegian Hero.....	197
Winter Gales and the New Skyscrapers.....	160	Steel Hand that Lifts Fifty Tons.....	198
Checks and Bank Notes that Speak.....	162	Long Reinforced-Concrete Viaduct in Cincinnati.....	198
Three-Horsepower Central Electric Station.....	162	Training Canaries in a Death Chamber.....	198
Novel Collapsible Body for Automobiles.....	163	Airman Photographed Falling to Death.....	199
An Electric-Wire Fatality.....	164	Gasoline-Electric Car with Roof Radiator.....	200
Fire at the Bank of England.....	164	An Unusual "Spite-House" Idea.....	200
Australia Has Talking Sign in England.....	164	Cavalry Equipment is Brought Up to Date.....	201
Enormous Gas Holder for Baltimore.....	165	Cable Runway Launches Hydro-Aeroplane.....	203
"Knockdown" Concrete Bungalow.....	165	Paris Has Steam Street-Railway Service.....	203
Harnessing the Mississippi for Hydroelectric Power.....	165	Men Wear Blinders as Object Lesson.....	204
Catching Grasshoppers with Suction Wagon.....	168	Modern Rifle Wounds in the Balkan War.....	204
Mine Telephone Operated by Throat Vibrations.....	169	Typewriting 593 Words a Minute.....	205
British Dirigible with Torpedo-Shaped Car.....	169	Automobile Equipped with Wireless Telephone.....	205
Businesslike Costume for Feminine Climbers.....	170	An Arab "Wind Tower".....	205
An Aeronaut Explodes His Balloon with Dynamite.....	170	Stands on His Head on Skyscraper.....	206
Railroad Furnishes Stump Pullers to Farmers.....	170	New Zeppelin Dirigible Breaks All Records.....	206
Electric Drill Held in Place by Magnet.....	171	Power Development at Niagara Falls.....	206
Molding Lead into Works of Art.....	172	Faster Bullets for New Army Rifle.....	207
Terrific Speed Made by Automobile.....	172	Boston's New Electric Mail Tubes.....	207
Stepless Storage-Battery Cars for New York.....	172	Highest Tower in World Proposed for Germany.....	208
The "Bookless" Library of "Castlegould".....	173	"Walking Club" Organized to Find City's Faults.....	208
Sponge Farming in the Ocean.....	173	Measuring Wind Pressure on Aeroplanes.....	208
Large Chinese "Junk" for Panama Exposition.....	174	Quick-Action Drill for Brickwork.....	209
Using Electricity in Excavation.....	174	Pressure Gauges of Big Floating Dock.....	209
Oiling Locomotive Wheel Flanges with Spray.....	175	Two-Passenger Single-Seat Motorcycle.....	210
Balanced-Beam Bridges over English Canal.....	175	How Seals Cut Steps in Ice Cakes.....	210
Automobile Fitted to Carry Bicycle.....	175	Field Telephone of the Mexican Army.....	210
Automatic Fire-Sprinkler Demonstration.....	176	Girls Cross River on Two-Rope Bridge.....	211
Chameleon Effects for Coming Dresses.....	176	Practical Demonstration of Auto Mud Slinging.....	211
The Manhood Dance of the Amaxosa Tribes.....	176	A Portable Outfit for Pigeon-Photographers.....	212
Gun Caisson Converted into Tower.....	177	The United States Army's "Flying Boat".....	212
Bungalow Constructed of Irrigation Piping.....	178	Luxurious Motor Car for Touring.....	213
Electrocution for Diseased Animals.....	178	Growing Three Oaks for Town Symbol.....	213
Vessel Launched with Steam Up.....	179	Struggling to Feed the Voracious Oil Engine.....	215
The Government's Rack of Precious Mugs.....	179	By J. C. Miller, M. E.	
Calliope Mounted on Steam Roller.....	180	Fifty-Five Miles an Hour on Soup-Bowl Track.....	217
Fire Photographed by Its Own Light.....	180	Artistic Picture Made of Paper.....	217
How Far Light Beams can be Thrown.....	180	Postage-Stamp Vending Machine Adopted.....	218
Electric Furnace for Producing High-Grade Steel.....	181	New York's Skyscraper Apartment Houses.....	218
Columbus Goes into McKinley Statue.....	182	Enormous Power from Water Mains.....	219
Scenes from the Balkan War.....	183	Bulldoz Chimney with Wagon Wheel.....	220
Lighting the Panama Canal.....	186	Saved from Death by a Match.....	220
High-Pressure Gas-Lighting Tests.....	187	Fatal Head-On Collision at Indianapolis.....	221
Acetylene Railway Signal.....	187	Cash Register Mounted on Rear of Automobile.....	221
Skyscraper Which was Not Fireproof.....	188	The Lantern Ceremony of Bryn Mawr College.....	222
Testing Hardness of Rails by Ball Pressure.....	188	A Birthday Cake for a City.....	222
Novelties at the French Automobile Show.....	189	Water-Pipe Leaks Found with Blue Solution.....	222
Battleships Too Big to Enter Ports.....	190	Trophy for Long Flight Awarded.....	223
Valveless Pump Creates Highest Vacuum.....	190	Live Dog as Part of a Muff.....	223
Aerially Propelled Hydrocycle.....	192	Aeroplane Photograph of Aeroplane Plant.....	224
		Court Decides that Ditch is not Part of Road.....	224
		Keeping Tab on Birds by Leg Bands.....	224

[Continued on Page 6]

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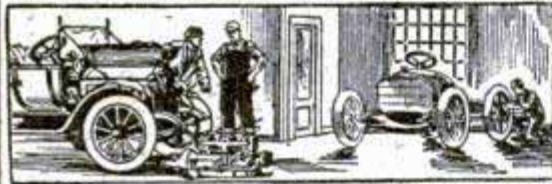
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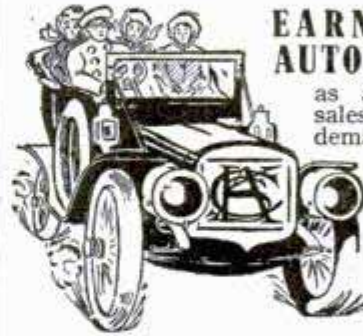
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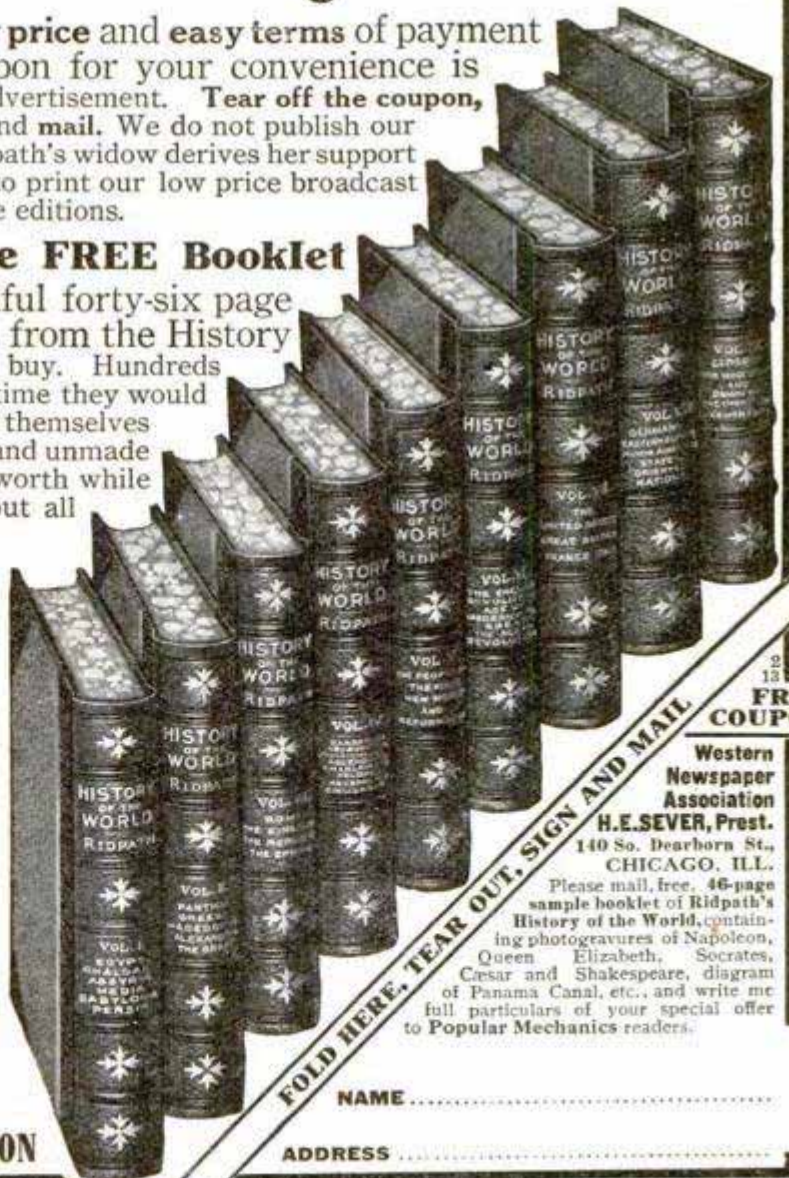
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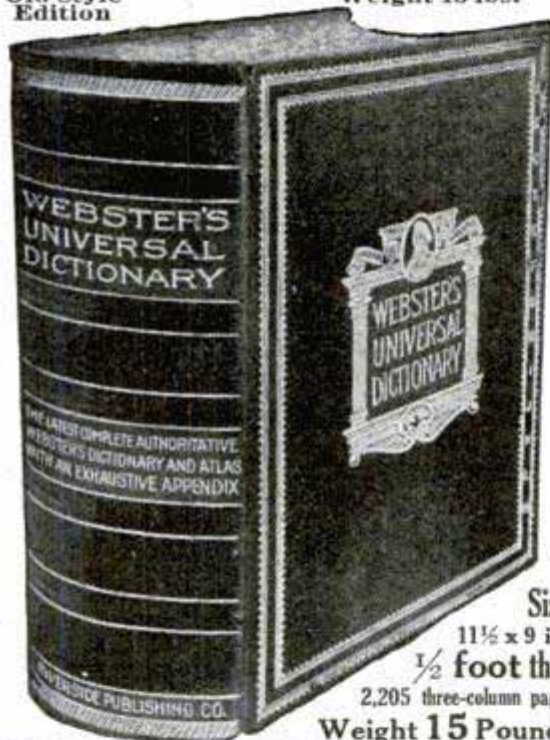
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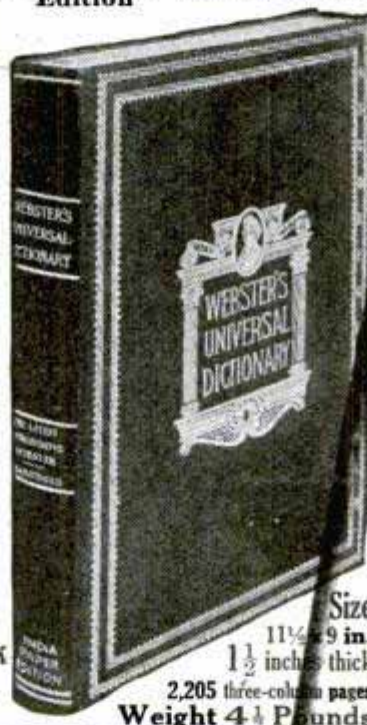
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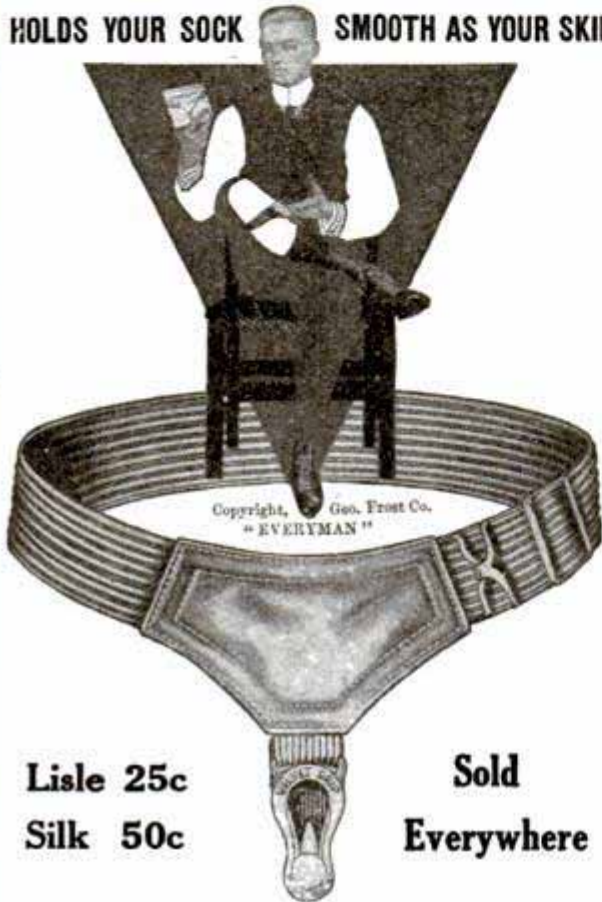
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- First Prize—HENRY J. MARION, Pontiac, Mich. \$10
"Separating Steel Balls of Different Sizes"
Second Prize—FRED L. KING, Islip, N. Y. \$5
"Drawers in Stair Steps"

EXTRA AWARD

On account of there being five contributions this month each of which deserved second prize, we have made an EXTRA AWARD of four additional second prizes, as follows:

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F. H. TILLOTSON, Sycamore, Ill. \$5
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"Compression Spring for an Oil-Can Bottom"
HOWARD WEDDLE, Dinuba, Cal. \$5
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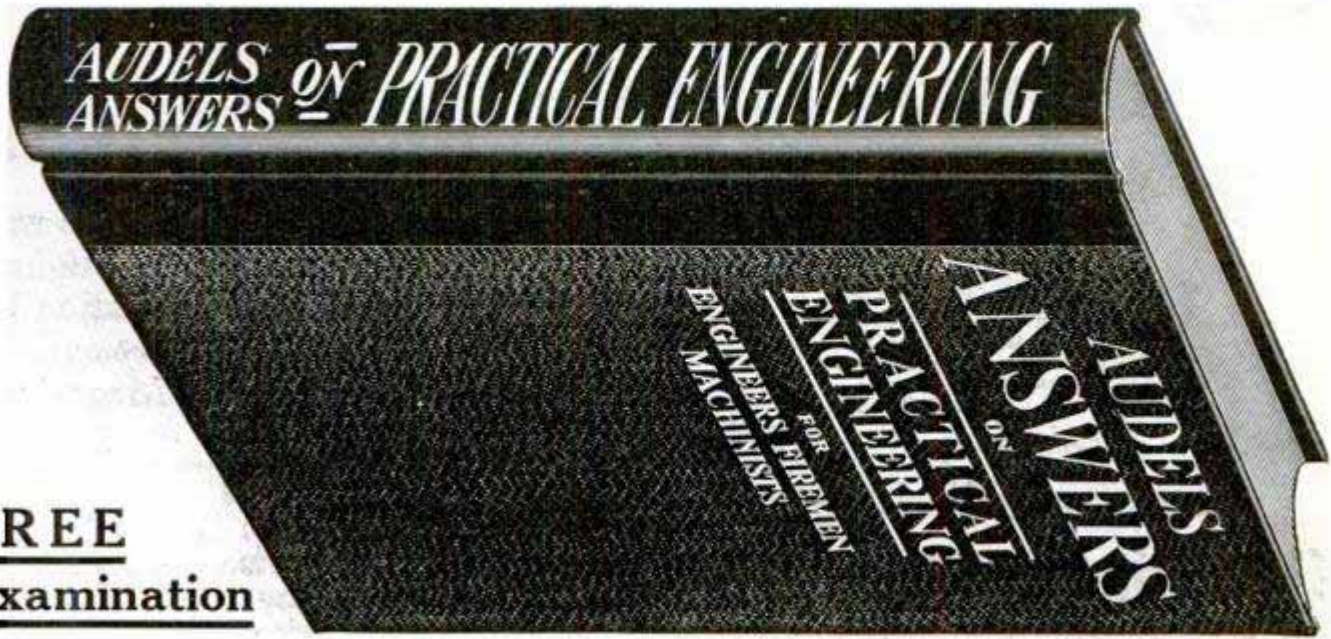
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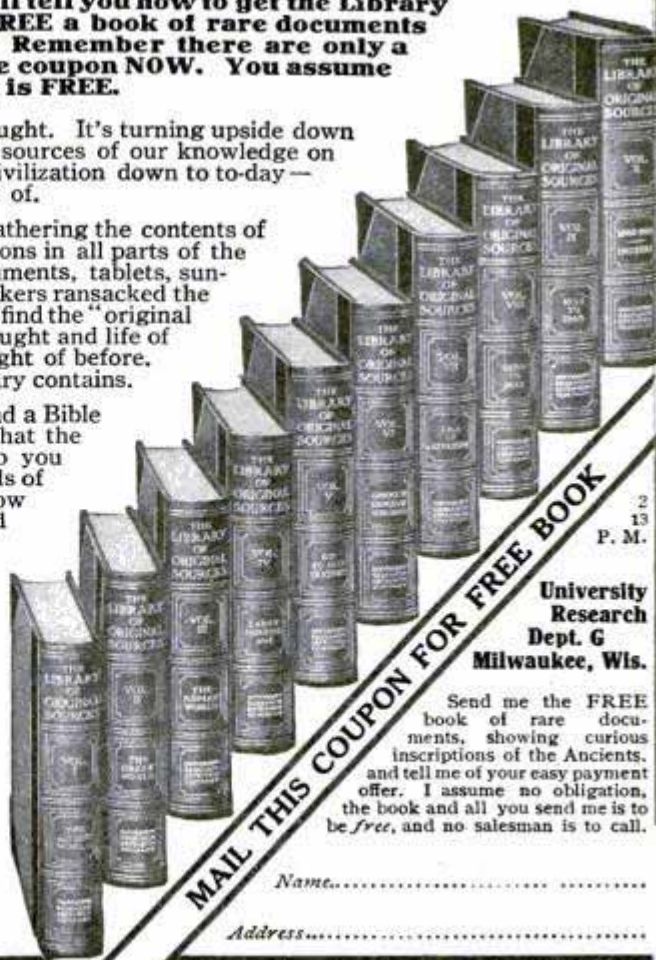
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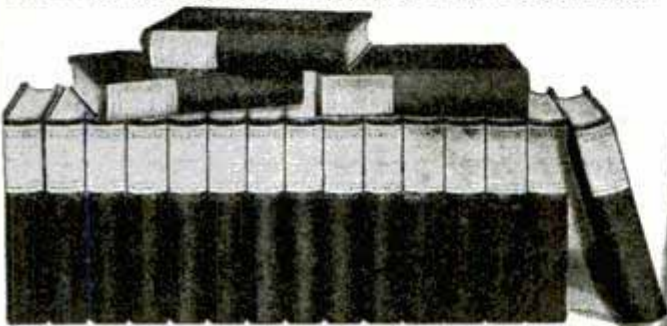
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HERE'S Your Chance. \$10 starts as clean, legitimate and independent a mail order business as you can put your name to. Indisputable proof, facts and details free on request. Address Expert, 420 Home Bank, Baltimore, Md.

EARN \$7 to \$12 daily, restoring faded colors in rugs and carpets. Whole or spare time. Original American Process. Great demand. No capital. Full particulars free. Eldred, Dept. 75, Detroit, Michigan.

FREE—For 5c to cover advertising, etc. I'll send, sealed, sample circular and full instructions for operating scheme that brought me \$2 an hour. If satisfactory, remit \$1; if not, return. Robert Fink, Kane, Penna.

LEARN the truth about Mail Order Business before buying outfits. Valuable information and particulars free. Mail Order Library, P. Tompkinsville, New York.

GUARANTEE anyone \$50 weekly from start, without capital. No canvassing. Something new. Better investigate quick. Make your spare time profitable. L. N. Todd & Co., Holladay, Va.

START an anti-fly crusade and make money manufacturing traps. Our plans make success easy. Enclose 10c. A. E. Chapman, Official Fly Catcher, Redlands, California.

MAKE \$10 daily restoring colors to faded rugs and carpets. Spare time. Tremendous opportunity everywhere. Simple, easy. Mirror Silvering course free. Free particulars. Coxe, Dept. MD., Omaha, Neb.

FOR Sale—Drug Store on one of the best corners in Louisville, Ky. Exceptional opportunity. For particulars address Crescent, 250 S. Hite Ave., Louisville, Ky.

CONDUCT Paying mail order business from your home. \$5 starts business, complete course \$1. Particulars free. Box 115 Brooklyn, N. Y.

BE a manufacturer! Big profits. Easily done. Your kitchen will serve as a factory. Sample formula, lists and plans 10c. The Anjo Company, Box 497, Galesburg, Ill.

START a mail order business. Reliable guide tells how, where to buy, 25c. Geo. R. Allen, Bound Brook, New Jersey.

LEARN the "Dry Cleaning" business. Complete instructions 20c. Profitable Service Bureau, 4333 N. Sawyer Ave., Chicago.

MAKE money winter evenings. Turn your time into cash. Small capital. Particulars free. P. Benson, Stewartville, Minnesota.

MAIL Order Business. I start you free. P. Newnham, Waukegan, Ill.

SOUTH America's gigantic money making opportunities for large and small capitalists—and for colonists—send 10c for copy of consular report and booklet on Peru. Stevo. Seljan, Official Immigration agent for government of Peru, 1441 A, Old Colony Bldg., Chicago, Illinois, U. S. A.

SPECIAL Offer—Your name in our directory. Big mail for you. If interested in the mail order business; agents opportunities; plans, formulas, etc. Subscribe to our magazine three months, 10c. The "Lever" Mail Trader, 44 Elizabeth, New Jersey.

BE Your Own Boss. Start mail order business. We teach you. 20 years established. Everything furnished. "Starter" free. Krueger Co., Dept. 2B, 167 W. Washington, Chicago.

WIDE-Awake inventors, men with ideas and small manufacturing concerns may obtain financial assistance from the Kenton, Ohio, Commercial Club. Visit Kenton immediately if you mean business. Harry Hopwood, Sec'y.

1,000 MANUFACTURING mail order secrets 25c. Stevens & Co., Buffalo.

SEND for my booklet "How you can become your own master," without capital in a business in which there is no competition. E. Daugherty, 1236 W. Madison St., Chicago, Ill.

ADVERTISERS, Mail Order Men, Circular Mailers. Join the Mail Order Business Club, particulars free. Circulars mailed, 15c 100. John Griesmaier, 5952 Lowe Ave., Chicago, Ill.

BIG Money in the Mail Order Business. Experience unnecessary. Small capital. Instructions free. Keith, 719 Central Bldg., Rochester, N. Y.

DISTRICT managers (men or women) wanted to handle our line of quick selling specialties through sub-agents. Small capital required. Big profits assured. Get busy now for territory. Sanito Co., Rochester, N. Y.

ESTABLISHED business in Grand Rapids, Mich. \$2,500 cash or time. Would take automobile or diamonds as part pay. F. J. Lamb, 162 Baldwin Ave., Detroit, Michigan.

WANTED—Good automobile mechanic, with little capital to invest in growing business. Address Expert, 6th floor, 318 W. Washington St., Chicago.

MAKE your advertising pay better by placing it through a reliable, legitimate agency, at no extra cost to you. Get our advice about your proposition. Pevear & Co., Rochester, N. Y.

SEND for my circulars of new money making ideas. Postal will do. Chas. Metz, P. O. Box 87, Times Sq. Station, New York.

QUIT Wage Slavery. Own a Business. We start you. No capital required. Free particulars. Home Supply Co., Springfield, Missouri.

BE a chewing gum manufacturer at home, no machinery necessary, complete formula \$1. Particulars for stamp. A. J. St. Germain, 72 Canal St., Lewiston, Maine.

START a Money-Making Mail Order Business on \$5 to \$10 capital. Particulars free. National Sales Co., Peoria, Ill.

PATENTABLE Ideas Wanted—Send for 3 free books. R. B. Owen, 39 Owen Bldg., Wash. D. C.

MAKE money. Sharpen safety razor blades. This device sharpens any style blade. 50 cents prepaid. Free circular. Jens Mfg. Co., 1164-39th St., Brooklyn, New York.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Revision and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste materials, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

BIG Profits for You! Manufacture Barley Crisp. New confection. 5c package costs you 1c. Machine, instructions complete \$7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1605 Hyde St., San Francisco.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorhies. Desk C. R., Omaha, Neb.

BE a Mirror Expert. \$3-\$10 day; spare time home at first; no capital; we train, start you making and silvering mirrors; French method. Free prospectus. W. P. Derr, Pres., 87 Saratoga Ave., Brooklyn, New York.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

MANUFACTURE Gold Letters for signs—\$100 per month easy. I start you. Experience unnecessary. Take like wildfire. Prospectus free. J. F. McPherson, 673 Brown Avenue, Butler, Pa.

PATENTS Secured—C. L. Parker, 910 G St., Washington, D. C.

OPERATE Hahn's Premium Machines. Let them gather pennies for you. The best seller for cigars and candies. J. L. Hahn, 1016 Germantown Ave., Philadelphia, Pa.

FORM a corporation—Congress Law for D. C. and all States; cheap. Raise money easily. U. S. Legal Corporation, Washington, D. C. Representing \$1,225,000,000.

COLLECT money by a sure, simple, system. Income \$1,000 to \$5,000 a year. Quick results. No capital required. Instructive book. "Skillful Collecting," free. National Collectors Ass'n., Long Street, Newark, Ohio.

FORMULAS furnished by expert chemists, for manufacturing Toilet, Household, and Technical products. Government serial numbers obtained. Catalogue for stamp. B. Mystic Company, Washington, D. C.

WE Help Raise Capital at once to start you in retail—manufacturing—patent—real estate—mail order or any legitimate business by means of "Our Practical Method." Particulars free. The Business Aid Co., K594, Detroit, Mich.

AN intelligent person may earn \$100 monthly corresponding for newspapers. No canvassing. Send for particulars. Press Syndicate, 700, Lockport, N. Y.

I Made \$50,000 in five years with a small mail order business; began with \$5. Send for free booklet. Tells how. Heacock, 5074, Lockport, N. Y.

FOR ADVERTISERS

YOUR 30 word ad in our 20 Page Postcard Magazine, 15c. Display, 50c inch. Elite Exchange, 3827 No. 44th St., Chicago.

PLACE your advertising through a reliable, legitimate, recognized agency, at no extra cost to you. Our expert knowledge of advertising and selling is at your service. What is your problem? Pevear & Co., Rochester, N. Y.

YOUR ad placed in nearly fifty magazines, 3 months, 5 cts. per word. Give us a trial ad. A. S. Mankin & Co., Alexandria, Va.

"THE Ad Writers' Assistant"—Book containing 350 phrases, headlines, suggestions, interesting opening chapters, each illustrated with appropriate cut, mailed, 25c. Cuts supplied. F. S. Ailes, Drexel Building, Philadelphia.

BARGAIN Advertising Rate—Just to get acquainted—15 words, one insertion, guaranteed 10,000 copies printed, and one year's subscription 25c. Digest, Grand Rapids, Mich.

STRONG, Persistent and Convincing copy for Form Letters, Followups, etc. Marshall Hathaway, Rolling Prairie, Ind.

500 GREAT advertising secrets, postpaid 25c. Morris, 617 Passyunk Ave., Philadelphia, Pa.

MECHANICAL ENGINEERS

ELECTRIC Light and Power draughting solicited. Robert Mather, Windsor Locks, Conn.

MACHINE designing and building our specialty. Consulting Mechanical and Electrical Engineers. Pullman-Field Machine Co., Sodus, N. Y.

MACHINE designing, working drawings, experimental machinery. Cary L. Abbott, Mechanical Engineer, 1341 Unity Bldg., Chicago.

IDEAS developed. Patent and working drawings. Blue printing. Julian Forrest Company, Desk H, Box 362, Providence, Rhode Island.

CEMENT

CONCRETE Building Block Machines and moulds. Free catalogue. 5 Market St., St. Louis, Mo.

CEMENT Finishing Tools. Eighteen \$3; worth \$14. Catalogue. Ernest Benninghofen, Hamilton, Ohio.

If you want the best information on cement and concrete construction, subscribe for Concrete-Cement Age, leading cement and concrete monthly. Sample copy, 10 cents. Yearly subscription, \$1.50. Concrete-Cement Age, 135 Newberry Bldg., Detroit, Mich.

ADJUSTABLE Burial Vault Moulds, new and simple. Make the best vault known and offers big profits for right man. Write for booklet, A. S. V. Co., Peru, Ind.

MACHINE making Building Stones, fifty cents. William Barten, Gordon, Nebraska.

COLLECTIONS

CLAIMS; all kinds, collected anywhere. Fidelity Credit Co., Richmond, Va.

AGENTS WANTED

AGENTS Wanted—Here's big money for you—and a stylish nobby suit absolutely free. \$40 a week easy. Many are making more. Nothing to learn. Nothing to buy. Nothing to invest. No capital required. We furnish everything free—even the suit of stylish clothes you wear. Our men are the swell dressers and it don't cost them a cent, and they make big money every week. Get in now. Now is the time for the big money. Your name on a postal brings everything free. The hand-somest lot of samples of the latest suitings you ever looked at to choose your suit from. And a book of fashion plates showing the very latest, nifty, nobby styles; also measuring blanks and everything needed—all free. We pay expressage on everything. Send that postal now—don't wait. This is your chance—grasp it. American Woolen Mills Co., Dept. 214, Chicago.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for \$3.50 and saves the purchaser an investment of \$25. Write for particulars. The Handy Light Co., 13 Handy Light Block, Cincinnati, Ohio.

BE Independent. Make \$50 weekly with a New Invention, just patented. 8c profit on every dime. Small investment. Experience unnecessary. Circulars mailed free. International Metal & Ferrotyping Company, Dept. B13, Chicago, Ill.

"AGENTS Wanted" advertisers are most successful and enthusiastic users of advertising space in Boyce's Weeklies. The 1,000,000 circulation pays big. Write for free Result Checking Book. Use letterhead, 500 Dearborn Ave., Chicago, Ill.

HAVE you a few hours to spare? We want man or woman in each town. No capital needed. An hour's work shows dollars earned in spare time. Pocket sample. 400% profit. G. C. Mfg. Co., (Dept. 191), 29 Warren St., N. Y.

AGENTS—Sell our high-grade line of perfumes, toilet articles, soaps and combination boxes. 150% profit. We are manufacturers. Hopfinger & Roth, 218 N. 2nd St., St. Louis, Mo.

SIGN letters. Every firm wants them. Something entirely new. Nice, pleasant business. Paul Jacob, 25 Third Ave., New York.

KEY Checks—\$1.45 per 100. Dies for stamping names on checks, fobs, umbrella plates. Wholesale prices—Collar clips, sewing awls, etc. We show you how to make \$5 per day. Pease Die Works, Dept. M., Winchester, N. H.

AGENTS—Fine opportunity to make good money; brand-new, clean-cut proposition; want hustlers. Send for particulars today. Stewart Specialty Co., Chittenden Ave., Columbus, Ohio.

AGENTS Wanted for new rapid selling household specialties; particulars, catalogue and samples free. Fairchild Specialty Co., 3910 Bell St., Kansas City, Mo.

\$21 PROFIT six hours; made by agents demonstrating most perfect hand power vacuum cleaner—made (carpet sweeper type). Liberal commission and cooperation. Exclusive territory. Yaxley Mfg. Co., 1035 Wash. Blvd., Chicago.

INVISIBLE Pen-Pencil Holder. Holds several. Unique. Agents over hundred per cent. Sample 10 cents. Nouveau Sales Co., Raleigh, N. C.

AGENTS—Manufacture Excelsior polishing cloth. Formula, 25 cts. postpaid. Leroy Gibson, Rockland, Me.

GUILFORD Kerosene Mantle Lamps—America's largest variety. Burners fit ordinary lamps. The agents' sure money makers. Guilford Co., Seville, Ohio.

ORGANIZER'S Bonanza. Everybody wants land on the Co-operative Homestead Plan. A. Hawk, Crystal Springs, Fla.

AGENTS—New patent, just out, has unlimited field. Over 80% profit. Good side line. F. Huxley, 6032 St. Lawrence Ave., Chicago.

F. E. FUCHS, 38 Park Row, New York, wants agents who can sell a staple article. Both sexes.

\$4 DAILY. Indestructible pens, outwear all others. Pkg. 10c. P. M. Miles Co., Lynn, Mass.

MAKE \$21 next Saturday. Sell startling new invention—just out. Combination Burner and Filler for all Coal Oil Lamps. Unbreakable steel mantle. Big white powerful light. No smoke or smell. Fills Lamps quick. No dirty hands—no slopping oil. Low in price—selling like wildfire. Agents coining money. Johnson, Fla., cleared \$40 first week. Hess, Iowa, made \$7 one day. Exclusive territory and protection free. Not sold in stores. Send no money but write quick for details. Fairchild Co., 512 Nasby Bldg., Toledo, Ohio.

AGENTS with executive ability wanted to sell a mechanical device that positively removes shine from clothing. Case is highly-polished aluminum, and contains abrasive rollers. Same size as a cake of soap. A high-grade article, and owing to its usefulness and appearance it is selling rapidly. Send 50 cents for sample machine. Money back if not satisfied. Exclusive territory. Our proposition is liberal. Write now. L. D. Berger, 59 North 2nd Street, Philadelphia, Pa.

YOUNG Man, would you accept and wear a fine tailored suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use \$5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000 write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 27, Chicago.

SALESMEN, get our dazzling "Book of Gold" Men's Free Tailoring Outfit. Classiest ever attempted—the absolute limit of sartorial supremacy. Success sure. Our men coining money daily—hourly: "Book of Gold"—your gorgeous free suit—\$5,000 cash satisfaction bond—smash competition. Get our wonderful Big Free Offer Quick! Postal brings everything for comparison; then see how measly otherwise are. Great Central Tailoring Co., Dept. 320 Jackson Blvd., Chicago.

WANT three swell made-to-measure shirts? Show our samples to friends, take a few orders easy and make enough profit to get yours free. New fancy patterns, made just as you want them. One good agent wanted in each town, spare time or all time. Write for beautiful samples, wholesale and retail prices and our liberal offer. Peerless Shirt Makers, Dept. 3, Chicago.

AGENTS—Be quick—get the agency—never such a seller—make \$100 a week—Model Vacuum Cleaner—carpet sweeper type—wonderful suction—Sells for \$8.50—your profit over 100 per cent—no competition—patented—we start you—the Cleaner sells itself—free samples to workers. Model Vacuum Co., D30, Cincinnati, O.

OUR wonderful stove lid saves one-half of coal; hundreds in use; requires only ordinary mechanical ability to install; demand tremendous; the biggest seller of the year; 150 per cent profit for agents; write quick for full particulars, testimonials, etc. Pre-Heated Air Co., Room 627, 1011 Chestnut St., Philadelphia.

AGENTS—Would You Take a Steady Job where you can make \$30 weekly and chance to work up to district manager with yearly profit of \$3,000 or more? No experience required. My goods are snappy self-sellers that make and hold customers. Need fifty more agents now. If you want to make big money quick, write today. E. M. Davis, 1038 Davis Block, Chicago.

\$50 A WEEK upwards; agents wanted for the sale of electric light intensifiers; a new invention which doubles the light without extra current; interesting to every user of electric light; limited territory reserved for agents; apply at once. Intensifier Light Co., New Britain, Conn.

YOUR Boy's Spending Money—Boys, also men, wanted in every city, village and rural district to put up the Never Slip Clothes Line Holder. Big profits. Send 15c for complete working outfit. Address C. N. Allerding, Mansfield, Ohio.

THOUSAND Agents immediately. New device. Repairs puncture in one minute. Automobile owners delighted. Agents make day's wages every sale. L. M. Zinser, Monte Vista, Colorado.

\$1,000 EARNED by three people within thirty days selling our Fire Extinguishers. Buyers everywhere; protected territory; 500% profit. Local and State Agents wanted. United Manufacturing Company, 1242 Jefferson, Toledo, Ohio.

AGENTS Wanted—We want a live man in every town to act as a sales manager. We want you in your town. Devote your spare time to our business and you will make bigger money than you ever made before. Give us all your time and we will make you rich. These are facts, not promises. \$50 a week at the start. Besides, a nobby free suit—and all the clothes you want at less than wholesale price. Wear one of our free suits as an advertisement and people will flock to you to buy a suit like it and you will coin money. Get our money making proposition and beautiful book of samples. Just send a postal card. We pay express charges on everything. Join the live wires—send us a postal today. Paragon Tailoring Co., Dept. 214, Chicago.

AGENTS own your own business; no capital needed; steady income selling our new changeable signs, gold and silver letters; in demand everywhere. Write for catalogue. Climax Novelty Co., 703 Gay Bldg., St. Louis.

AGENTS—We have a proposition that appeals to every live agent. Write immediately for full particulars. Cowal Specialty Company, Department AC, Box 847, Richmond, Virginia.

SELLING Agents Wanted for "Fire Out." Best selling small fire extinguisher. A real money maker for you. Our proposition won't disappoint you. The Inst. Lighter Co. Dept. M., Columbus, Ohio.

AGENTS—Guaranteed Shoes, "must give satisfaction" or new pair free. All styles. Fit guaranteed. 98c profit on every sale. Quick seller. Write today for complete outfit. Guaranteed Shoe Co., 2262 Third St., Dayton, O.

AGENTS Wanted—Send 35 cts. for 1 tube of water proof shoe polish in aluminum case with dauber and polisher complete, and one of each of our catalogues, of rubber stamp, novelties, etc., with agent's terms. A. S. Mankin & Co., Alexandria, Virginia.

AGENTS—Get particulars of one of the best paying propositions ever put on the market. Something no one else sells. Can make \$4,000 yearly. E. M. Feltman, Sales Manager, 6124 Sycamore St., Cincinnati, O.

AGENTS on salary or commission. The greatest agents' seller ever produced; every user of pen and ink buys it on sight; 200 to 500 per cent profit; one agent's sales amounted to \$620 in six days; another \$32 in two hours. Monroe Mfg. Co. N. 6, La Crosse, Wis.

\$10 TO \$15 per day easily made, 15% profit, exclusive territory; our new cleaning, polishing, and dustless mop is the big money getter and record breaker. Duncan Bros., 2910 N. Troy St., Chicago.

AGENTS—Something live—something fresh—something new. Something that's a seller, and bringing our boys \$35 a week and up. National Manufacturing Co., Lemont, Ill.

AGENTS—Get busy; latest invention. Fix It. Millions being sold; orders coming fast; act quick; big profit. Sample 10 cents. Eastern Specialty Co., Hoboken, New Jersey.

AGENTS—\$50 to \$75 weekly guaranteed—General Agents to handle our Special Accident Policies, issued at \$1 to \$5 per year. Address Wm. Okey Weaver, Mgr., Schultz Building, Columbus, Ohio.

SALESMEN wanted to handle our specialty; sells at sight; earn big money easily; write for free instructions. American Specialty Co., 5 Mechanic St., Bradford, Pa.

AGENTS wanted for best automobile accessory proposition ever offered. Power Tire Pump to sell for ten dollars. F. E. Lortz Co., 2503 E. 55th St., Cleveland, Ohio.

AGENTS—Every home wants our specialty. Quick sales; \$4 to \$7 daily made. Fall leader sample free. W. E. Yates & Co., 1818 Clawson St., Upper Alton, Ill.

BURGLARS Beware! Best alarm invented, lever action, no wires, fires blank cartridge; sleep peacefully, intruders fly. Secure agency, make money, sells itself. Send 35c for nicked sample. MacCarthy Co., 361 7th St., Brooklyn.

AGENTS—Stop canvassing. Our district managers are making big money employing sub-agents. You can also. We show you how. Write for particulars stating territory preferred. Sanito Co., Rochester, New York.

MEN, Women, one-half is yours. Something old. Good seller. Good repeater. Not sold in stores. It's Forkia. Bacorn Co., Elmira, N. Y.

WASHING Done By Vacuum, no rubbing, sells on sight, \$2.25. Sample to agents, \$1.25. Woman's Labor Saving Device Co., Box 541, Minneapolis, Minn.

SILPLATE plates brass, copper, etc., with one rub. Guaranteed. Send for 50c bottle and agents' proposition. Wirthman Laboratories, Sixteenth and Grand, Kansas City, Mo.

AGENTS send for catalogue of household novelties, quick and easy sellers. Martin L. Zerega, Dorchester, Mass.

AGENTS—My Twelve "Moneymakers" bring repeat orders. Easy selling plans. Big profits. A. Rolfe, 923 N. Alder, Philadelphia, Pa.

SMALLEST alarm clock, Bible and telescope, 10c each prepaid. W. H. Gardner, A 1408 W. 22nd St., Los Angeles, Cal.

AGENTS—Advertising Pencils, Sample stamped with your name, etc., 10c. Randall Novelty Co., Nashua, N. H.

LADY Agents Wanted. Englewood Distributing Co., 5952 Lowe Ave., Chicago, Ill.

BIG money makers, particulars for red stamp. Detroit Filter Co., Detroit, Mich.

WHERE did your money go? Find out. Begin any time with our Daily Expense Record. It will keep you posted and reduce expenses. A very interesting and complete book—50c. Agents wanted. Auburn Supply Co., Dept. HH, 7746 Peoria St., Chicago.

HUSTLERS to sell splendid article, needed in every home and office, sure repeater, great money saver, salesmen coining money, 100% profit; Leroy Specialty Company, Desk 1, Huntington, Ind.

AGENTS! 1000% profit selling our beautiful religious masterpiece "Christ at Golgotha." Size 14x28 inches, beautiful colors. Sells like wildfire for 25c. Your cost \$2.50 per hundred. Sample 10c. Merchants Specialty House, 521 Dearborn St., Chicago.

CHANDELIER Clothes Dryer—Pulls up to ceiling on porch or in house. Clothes out of way. Holds good size washing or ironing; weighs three pounds; sent prepaid. \$1.50. Every home will buy one. Agents wanted—Auburn Supply Co., Dept. DD, 7746, Peoria St., Chicago.

SELL dealers, make 50 per cent on sales; good article, attractively displayed. Retails 10c; send 5c for sample. Rawlings, Box 1053, Central Station, St. Louis, Mo.

AGENTS—New Invention—Electric Cigar Lighter—Used on cigar cases. Sell to stores—best seller—big profits. Write for special starting offer. Drake Mfg. Co. 142 Reed St. Milwaukee, Wis.

AGENTS Wanted: sell our mission furniture. Big commission; exclusive territory. Dept. F. Lewis, Grove & Co. P. O. Box 183. Bluffton, Ind.

AGENTS—Big profits selling California Honey. Permanent business; steady repeat orders. Leaflet free. Spencer Apiaries Co., Box 199. Nordhoff, Calif.

CASH for names, addresses, information, etc. Steady income at home. Instructive booklet for stamp. Information System, 287 Marietta, Ohio.

AGENTS—Start now, just in season, big profits, easy sales. H. Vale cleared \$2,100 last year, McFadden \$1,800 selling Photo handle knives and razors. Write United Cutlery Co., E. Fourth, Canton, Ohio.

SIDE line—office specialty. Sells from pocket. 150 to 200% profit. Bayless Sons Company, Muncie, Indiana.

AGENTS and canvassers for books write for particulars. Kirk A. Box 3002, Philadelphia, Pa.

READ the Agents Magazine. Make more money. 2 months 10c. Agents Magazine, Chicago.

SIGN Agents—Painters—Something new and better. Attract ready-made Gold and Silver letters. 21 kinds, easily applied. Make big money lettering store windows, making signs, and selling our line of flashing, sparkling chipped glass name-plates. No experience needed. Write for sample letter and catalogue and start at once. Address Attracto Sign Co., 2655 North Clark Street, Chicago, or 519 Pacific Bldg., San Francisco.

LEARN Telegraphy at home—get salary \$100 month. Write now—Telegraphy—Box 481—Minneapolis, Minn.

\$50 A MONTH earned at your own home! No canvassing or collecting required. All our work may be done in any room of the house in spare time without interfering with your regular duties and without your nearest neighbor knowing you work for us. New system of business and the greatest offer ever made. Write now before it is too late! Blye & Co., Dept. 31, Terre Haute, Indiana.

MAN wanted as exclusive agent. We manufacture six styles Self-wringing Mops, for all purposes, including an absolutely new combination Scrubbing, Brushmop that is Self-Wringing. Every woman wants this proven success. New inexperienced men make \$9 per day. One man made \$120 the second week. No investment. Send for catalogue and exclusive territory proposition that will make you independent. Hilker Mop Co., 1200 Grand Ave., Chicago, Ill.

YOU can make big money handling our proposition—something unique—an article that can be sold in every house. The business can be worked by you either along Mail Order or Agency lines with unusual profit. Send ten cents for sample and wholesale prices or write for our literature; it's free. Northern Supply Co., 3453 N. Hamilton, Chicago.

MAKE \$5 to \$25 weekly in spare time as my representative. I manufacture three household articles every woman needs and buys. My prices are the lowest and Agents make over 100 per cent profit. Write today for particulars. J. C. Hoag, 553 Carpenter St., Mt. Airy, Pa.

BEST Yet, \$6 Profit on Each Sale. One lady agent took 5 orders first morning without experience. Rev. Waterman of Iowa sold 39 in 5 days. Any one can do it. Best and easiest operated Double-suction cleaner made, guaranteed 5 years. Warner Vacuum Cleaner Co., Box "Z," Muncie, Indiana.

NEW Invention—Flat Collar Button; lies flat; takes pressure from back of neck; constant pressure injurious; coat collar sets better; ties slip easier; agents coin money; new self selling plan; no canvassing; samples 10c. Carl Brown, Dept. P1, Columbus, Ohio.

AGENTS. More than double the sales in 1912 over 1911. If your locality is not now covered we can give you an agency which will net you \$15 to \$35 per week. Only people with good references need apply. Condifely Co., Box 1166, Boston, Massachusetts.

AGENTS—\$20 to \$40 weekly selling Hosiery, Underwear, Sweaters. Samples free to hustlers. Large line. Liberal commission. Sales Manager, Room 62, 54-60 Worth St., New York.

DID you ever hear of anyone selling Popular 25c Sheet Music at 5c? You can do it, and make 300 per cent. Four sample copies and proposition, 10c. Chicago Book & Music Co., 535 S. Wabash Ave., Chicago.

70c COMMISSION on \$1 pictures; new, beautiful; sell quickly into Catholic homes; profitable employment for reliable men and women everywhere. William F. Butler, Dept. J, Milwaukee, Wis.

WE furnish you capital to run a profitable business of your own. Become our local representative and sell guaranteed sweaters, shirts, neckties, underwear and Hosiery direct from our factories to the homes. Write, Steadfast Mills, Dept. 10, Cohoes, N. Y.

AGENTS sell rich looking imported 36 x68 rug \$1. Carter, Tenn., sold 115 in 4 days. Profit \$57. You can do as well. Write for selling plan. Sample offer. Exclusive territory. Sample rug sent by prepaid parcel post \$98. Condon, Importer, Stonington, Me.

\$2.50 PER day paid one man or woman in each town to distribute free circulars and take orders for concentrated flavoring in tubes. Permanent position. J. S. Ziegler Co., 443-D, Dearborn St., Chicago.

AGENTS. If you don't make \$4 profit the first day selling Tate's Guaranteed Dust Absorbing cloths, brushes, mops, etc., return sample outfit. Many agents make \$25. Write quick for particulars. Dept. A-4. Consumers Direct Supply Co., Boston, Mass.

SELLING our exclusive linen heel and toe guaranteed hosiery direct from mill to wearer. Pays big profits. Customers waiting. Re-orders insure permanent, increasing income. Exclusive territory. Credit. N. Parker Mills, 720 Chestnut St., Phila., Pa.

SALESPeople everywhere will wish to find out why agents of the "Ever Ready" Specialties are doing better than others. A postal will bring all particulars. A. Lowell Mfg. Co., 108 Fulton St., New York City.

EARN \$7 to \$12 daily, restoring faded colors in rugs and carpets. Whole or spare time. Original American Process. Great demand. No capital. Full particulars free. Eldred, Dept. 75, Detroit, Mich.

MAKE \$10 daily restoring colors to faded rugs and carpets. Spare time. Tremendous opportunity everywhere. Simple, easy. Mirror Silvering course free. Free particulars. Cox, Dept. MD., Omaha, Neb.

400% PROFIT. Quick Sales! Sell our Beautiful Air Brush Design Show Cards. 350 subjects, all businesses. Merchants buy on sight. Three big premiums free, just to get acquainted. Write today for catalog and premium offer. Merchants Specialty House, 523 Dearborn, Chicago.

AGENTS male and female wanted, for established proposition (Medical), stand strictest investigation, legitimate, good seller, splendid profits, write for samples, Edward Mulligan, Congers, N. Y.

AGENTS and Representatives Wanted. Non-Tarnishable Gold and Silver Window Letters, 70c per 100. H. Alexander, Manufacturer, 328 E. 59th St., New York. Established 1905.

AGENTS—100% profit—sell to saloons—machine a whirlwind seller. Free sample and salesmanship course. Two sales a day \$15 profit. Write. Simplex Mfg. Co., Dept. 7, Kewanee, Ill.

AGENTS make 500% profit selling our gold window letters, novelty signs and changeable signs. 300 varieties in enormous demand. Catalogue free. Sullivan Co., 1238 Van Buren St., Chicago, Ill.

AGENTS—We have ready winter sellers. Agents make big money. Write for our large new catalogue. Edward J. Perrin, 2106 Bank Street, Louisville, Ky.

GUARANTEED Boy's Watch or Girl's Gold Plated Bracelet, given for introducing our seed in your neighborhood. Outfit free. P. Peoples Co., B-89, York Haven, Pennsylvania.

QUICK selling Vacuum Cleaner, powerful sweeper type. Free sample to hustlers. Make big money employing sub-agents. Experience unnecessary. Vacm Co., 1488 Security Bldg., Chicago.

BIG money in Essex Fan Motors, run by gas or gasoline. Winfield H. Smith, 10 Lock Street, Buffalo, N. Y.

SALESMEN wanted to sell advertising novelties, nail File and Tooth Picks in leather cases, 25% commission, 2 samples 10c. Joel Kenyon, Owego, N. Y.

AGENTS—Either sex. Handle three articles housewives use weekly. Unique selling plan. Constant repeaters. Permanent income. Attractive proposition. Leibman Mfg. Co., Richmond Hill, New York City.

AGENTS—Send today for my new proposition. Appeals to everyone. 100% profit. Raymond Pfau, Wenatchee, Wash.

WE Pay \$80 A Month Salary and furnish rig and all expenses to introduce our guaranteed poultry and stock powders. Address Bigler Company, X368, Springfield, Illinois.

AGENTS—men and women, newest invention. Wing Self Heating Gasoline Flat Iron; guaranteed, sells everywhere. Women delighted. Write for particulars. Wing Mfg. Co., 1608 Fulton St., Chicago.

ONE Million Agents Wanted. Fast sellers costing 2c, selling 25c, in quantities to \$50. Every firm needs. Postal brings samples. Embossed Co., 240 West Illinois St., Chicago.

AGENTS—Make \$2 each selling our wonderful luminous crucifixes; nothing to sell six a day; absolutely new; shine all night in darkest room. Pioneer Portrait Co., 1259 W. 63rd St., Chicago.

SIGN Painting Agents. 1000% profit. Best and cheapest window letters made. Mounted sample free. Success positively guaranteed. Embossed Letter Co., 245 West Illinois St., Chicago.

YOU can make more money operating a Mail Order business, but before taking any chances invest 10c for two samples of "Booster"—the one bonafide Mail Order and Agents publication on earth—a magazine that has for years actually and accurately started others like you in business for themselves by publishing the best money making propositions on earth—ones that really get the money! Send 10c today—its worth dollars to you. **Booster Magazine**, Northwestern Building, Chicago.

\$61.50 WEEKLY introducing and selling a new Gas Light Burner for Kerosene Lamps. Beautiful light. No chimney. No mantle. Perfectly safe. Simple in construction. Nothing to get broken or out of order. Will not burn out. Durable. Will last for years. Low price. Easy to sell. 200 per cent profit. Experience not necessary. Sample free. Why not try one on your lamp? Beware of imitations. No branch offices. **Luther Manufacturing Co.**, Dept. 189, Cincinnati, Ohio.

AGENTS sell Pals Changeable Scarf Pin, make \$30 weekly, send stamp for free sample. **Pals Manufacturing Company**, 25 East 14th Street, N. Y. City

"KNIFE and Fork Cleaner" made of cork, felt and steel. Great, new agents' article. Sample 10c. **Bauer**, 135 East 34th, New York.

SHOW Card Agents making barrels of cold cash. Great two color catalog free. Write today. **Popular Show Card Co.**, Dept. FB, 1235 Michigan Ave., Chicago.

AGENTS—Big profits selling herb medicine. Repeat orders. **Knox Mfg. Co.**, Peoria, Ill.

SALESMEN—Make big money selling our devices. **Waage Electric Co.**, 680 W. Madison, Chicago.

ANYONE can make big money easy selling the Aladdin Kerosene Mantle Lamp. No experience necessary. A demonstration sells a lamp in nine out of ten homes. One agent sold over 1,000 on money-back guarantee, not one returned. Another made over \$300 in 15 days. Hundreds doing as well. Evenings may be made profitable. Special introductory offer to the first man in each neighborhood who writes for agency proposition. **Mantle Lamp Co.**, 351 Aladdin Bldg., Chicago, Ill.

AGENTS—\$50 weekly; we manufacture the best needle case made, a wonderful seller; 200 to 500 per cent profit; talking unnecessary; our copyrighted "Trust Scheme" Envelopes do the work; general agents can make over \$100 weekly; send 10c for a 25c sample containing 115 needles; particulars free; buy direct from the factory at wholesale. **Paty Needle Co.**, 102 Union Sq., Somerville, Mass.

AGENTS—County and State; men and women everywhere to sell the Pinless Clothes Line; a practical labor saving invention, lasts life-time, sells on sight, gives perfect satisfaction. Agent Sutton of Georgia, sold over million feet; 100% profit; write quick for exclusive territory; information free; sample prepaid 25c stamps. **Pinless Clothes Line Company**, 520 Wilcox Bldg., Portland, Oregon.

BEAUTIFUL Embossed Gold Window Letters make 1000% profit without experience. New easy proposition. Signs always needed. Ours last for years. Rock bottom prices. Essentials to work with mailed free. **Embossed Letter Co.**, 235 W. Illinois St., Chicago.

AGENTS. One cent invested in a postal card will bring you a \$35.00 to \$60.00 a week proposition. **Sterling Aluminum Co.**, Canal Station, Chicago, Ill.

AGENTS. Cost 2c, sell 25c. Sign letters put on with roller. Samples free. **Embossed Letter Co.**, 230 West Illinois St., Chicago.

SHAVEZY Guard makes Safety Razor of your own favorite blade. Excellent line for shopmen everywhere. Sample 25c. Particulars, red stamp. **Keon Mfg. Co.**, Waltham, Mass.

BOKARA Diamonds—Agents, everyone, to wear and sell our famous Bokara Diamonds. Write for sample offer and catalogue free. **Northwestern Jewelry Co.**, 52 Northwestern Bldg., Chicago.

\$10 A DAY for Agents. Selling the New 1912 Fall Style Silk Neckties and giving free with each purchase a beautiful Monogram Roman Gold Finish Cuff Link and Stick Pin Set. Samples free. **Dayton Neckwear Co.**, Room 25, Dayton, Ohio.

BE Independent! Start a mail order business in your own home. We tell you how, and furnish everything needed wholesale. An honorable and profitable business for man or woman. Particulars free. Many make \$3,000 a year. **Murphy Mfg. Co.**, South Norwalk, Conn.

MEDALLIONS sell at sight, 300 per cent to 500 per cent profit. Make up your own goods and be independent. "It's easy." Catalog free. **Fred Resag Co.**, 1205 W. Randolph St., Chicago.

AGENTS—700 Things a Boy Can Make—Can you beat it? Set of 4 books that sell for only \$1. Everyone is interested. Enough to keep a boy busy until he grows up. Parents want them for their lads. Good liberal commission. Exclusive territory. Write to **Popular Mechanics**, Book Dept., 318 W. Washington St., Chicago.

AGENTS—Easily earn \$25 to \$40 per week selling **Kno-Darn Guaranteed Hosiery**; direct-from-the-mill proposition; 20% better; costs less; **M. Garwood** sold \$400 worth in six weeks; send for free sample; no money required. **Kno-Darn Hosiery Mills**, Desk 15, Dayton, Ohio.

WE are the largest manufacturers of Twisted Wire Brushes in America. Highest grade goods, best service, highest profit. Write for our new catalog. You are sure to win. **Fuller Brush Co.**, 33 Hoadley Place, Hartford, Conn. Western branch, **Wichita, Kansas**.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. **Metallic Sign Letter Co.**, 406 N. Clark St., Chicago.

AGENTS—We manufacture glass paper. Plain glass windows made to look like real stain glass; something new; easily applied; big money maker; two sample sheets of paper, with catalogue in colors and discount sheet, for 10c. **S. H. Parrish & Co.**, 202 S. Clark St., Chicago.

AGENTS Wanted—Mechanics and shopmen make over \$100 a month in spare time selling transparent handled novelty knives and razors. Big profits. Sales easily made. Write for terms today. **Novelty Cutlery Co.**, 67 Bar St., Canton, O.

YOU can make \$\$\$\$ as our general or local agent. Household necessity; saves 80 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. **J. Pitkin**, 113 Redd St., Newark, N. Y.

500% PROFIT selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. **Metallic Letter Co.**, 406 N. Clark St., Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. **Voorhies**, Desk C. R., Omaha, Neb.

AGENTS—What size Silk Hose do you wear? Send no money. Write today. Offer expires 30 days. Agents wanted in every town. Large profits. Beautiful line. **Triple-Wear Mills**, Dept. D., 112 So. 13th St., Phila., Pa.

AGENTS—Handkerchiefs, dress goods. **Carleton** made \$8 one afternoon; **Mrs. Bosworth**, \$25 in two days. Free samples. Credit. Stamp brings particulars. **Freeport Mfg. Company**, 59 Main St., Brooklyn, N. Y.

AGENTS—Portraits 35c. Frames 15c. Sheet Pictures 1c. Stereoscopes 25c. Views 1c. 30 days' credit. Samples and catalog free. **Consolidated Portrait Co.**, Dept. 1196, 1027 W. Adams St., Chicago.

PORTRAIT Agents—Send for free catalog Portraits, Frames, Medallions, Pillow Tops, Sheet Pictures, etc. Prices, quality considered, lowest of any. **Pioneer Portrait Co.**, 1265 W. 63d St., Chicago.

AGENTS—Our **Columbia Folding Hand Bag** is the best proposition on the market. Not sold in stores. Big profit. Write for terms and other big sellers. **S. V. Diamond**, 35 West 21st St., N. Y. C.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. **G. F. Redmond**, Dept. 306, Boston, Mass.

AGENTS—250% profit. Wonderful little article. Sells like wildfire. Can be carried in pocket. Write at once for free sample. **H. Mathews**, 1962 Third St., Dayton, Ohio.

AGENTS—Ask us about our snappy household specialty line which will clear you \$50 to \$80 weekly. **American Aluminum Co.**, Div. 7, Lemont, Ill.

I WANT salesmen to sell an advertising novelty of merit. Side line or exclusive. Sample free. Desk 1, **Andrew Paysen**, Clinton, Iowa.

AGENTS make \$30 week by selling our 500 handy household articles; catalogue free. **Scheff Co.**, Desplaines, Illinois.

AGENTS—Do you want to make big money? Then write today for our plan and be independent. **Benjamin Ray & Co.**, Box 479, Lumpkin, Ga.

DON'T fail to read **Independence and Fortune** under **Business Opportunities**.

AGENTS—Ladies or gentlemen, to sell the highest grade toilet goods, flavoring, etc., direct to families. High class house; fair dealing; repeat orders sure; large cash commissions. Address **Kingham Bros.**, Indianapolis, Ind.

HOT Seller. Over 100% profit. House door guard. Every housewife wants one or more on sight. \$1 a dozen, \$10 gross. Sample postpaid, 20c. **Allen Door Guard**, 215 Loomis Street, Chicago.

400% PROFIT selling **Gordon Photo Pillow Top**. High grade work. Samples and catalogue free. **Luther Gordon Co.**, Northwestern Bldg., Chicago.

REPRESENTATIVE wanted in every city and town—whole or part time—to handle best paying business known. Legitimate—new—exclusive control—no canvassing. Address **Drawer 165D**, New Haven, Conn.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. **Cincinnati Specialty Mfg. Co.**, Dept. B, Cincinnati, Ohio.

AGENTS—Mail Order Men. Your 25 word ad in 100 Magazines, \$1. Box 22, Station B, Worcester, Mass. **The Williams Specialty Co.**

AGENTS in every town, best selling household articles. Start at once. Large demand for goods. \$25.00 to \$50.00 a week. Success assured. Investigate today. **Main Specialty Co.**, Dept. H, Williamsport, Pa.

AGENTS wanted for Oriental novelties, never before seen in America. Quick sellers. Repeaters. Immense profits. **Shaw Kanematz**, Box 529, Portland, Oregon.

1500% PROFIT selling our **Gold Sign Letters**. We'll show you how. Sample free. **Johnston Co.**, Quincy, Ill.

PHENOMENAL Success awaits salesmen with our sales-driving specialties. **Emporium Co.**, Minneapolis, Minn.

HELP WANTED

WE train detectives. You can be one. Splendid opportunities. Travel. Earn \$100 to \$300 monthly. This fascinating profession taught practically and scientifically by mail at a nominal cost. **American School of Criminology**, Dept. F, Detroit, Mich.

GET Away from wage slavery—make more money! Operate a good substantial Mail Order business—our "Silent Salesman" system—can easily be done in spare time yet the possibilities are unlimited. For years "Booster" has actually and accurately led thousands like you over the Successful Road to Wealth. To succeed you've got to read **The Booster Magazine** for "Booster" is Opportunity and starts you in business for yourself—tells you how to get the dollars by putting you next to the best money making propositions on earth—ones that really get YOU the money! Send 10c for two months trial subscription. **Booster Magazine**, Northwestern Building, Chicago.

SALESMEN—You can do a wonderful business with the Jewel Vacuum Sweeper (3 sizes.) It is the perfect non-electric household cleaner. Slightly, attractive, light, strong and absolutely efficient. Our salesmen are "cashing in" on its merit. We give you merchants' standing—with credit to do big business and advertise the Jewel in your local newspapers over your own name. A big offer for able men or women. Exclusive territory. Address General Appliance Factory, 1372 Main Street, Marinette, Wis.

MEN and Women Wanted for Government Positions. \$90 month. Thousands of Parcels Post Positions open. Annual vacations. No "layoffs." Common education sufficient. Influence unnecessary. Farmers eligible. Send postal immediately for free list of positions open. Franklin Institute, Dep't K 21, Rochester, N. Y.

YOUNG Man, would you accept and wear a fine tailored suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use \$5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000 write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 28, Chicago.

GET Your Preparation for the United States Civil Service Examinations from former United States Civil Service Secretary Examiner. "One Who Knows." Free Booklet. Arthur R. Patterson, Rochester, New York.

500 MEN 20 to 40 years old wanted at once in every state for Electric Railway Motormen and Conductors; \$60 to \$100 a month; no experience necessary; fine opportunity; no strike; write immediately for application blank; address Manager, W 11, Dwight Bldg., Kansas City, Mo.

U. S. GOVERNMENT needs thousands Railway Mail Clerks—Carriers—to handle Parcels Post. \$90 month. Vacations. Examinations everywhere soon. Common education sufficient. Write for list of positions open. Franklin Institute, Dep't K 21, Rochester, N. Y.

BIG Money Writing Songs—We pay hundreds of dollars a year to successful writers. Experience unnecessary. Song poems wanted with or without music—will pay one-half of profits if successful. Send us your work today. Acceptance Guaranteed if Available. Largest concern in the country. Free particulars. Dugdale Co., Dept. 265, Washington, D. C.

YOUNG men to learn shorthand. Big salaries. Assistance securing positions. Correspondence course by world's greatest court stenographer. Catalogue M free. Osgoodby School Stenography, Rochester, New York.

RAILWAY Mail Clerk examinations everywhere soon. Parcels Post requires thousands. Write for dates. Franklin Institute, Dept. K 21, Rochester, N. Y.

A MONEY Proposition—Represent me for half of the profits. Printing matter furnished free. Full particulars of my successful Mail Order Business on request. Hazen A. Horton, Desk 617, Tekonsha, Michigan.

GOVERNMENT Railway Mail Clerk examinations everywhere soon. Get prepared by former Government Examiner. "Real Courses." Write now for free booklet. C. Patterson Civil Service School, Rochester, New York.

PARCELS Post Jobs open. Write for list. Franklin Institute, Dep't K 21, Rochester, N. Y.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

BE a Detective; Big pay. Easy, pleasant work. Traveling everywhere. Write National Detective Agency, Department 2, Houseman Block, Grand Rapids, Mich.

GOVERNMENT Jobs Open to Men and Women. \$90 month. Write for list of positions open. Franklin Institute, Dep't K 21, Rochester, N. Y.

BIG Profits. Open a dyeing and cleaning establishment, little capital needed. We teach by mail. Write for booklet. Ben-Vonde System, Dept. C, Charlotte, North Carolina.

EARN \$10 to \$15 a week, and hold your position besides. No canvassing. We, as manufacturers of patented just-in-season specialties, have new easy mail order plans to keep factories busy. We furnish everything. Large profits. Small capital. Experience unnecessary. If you are one of the want-to-go-ahead kind, write for our most modern (copyrighted) plans. Sworn Statement. J. M. Pease Mfg. Co., 540 Pease Bldg., Main St., Buffalo, N. Y.

LOCOMOTIVE Firemen and Brakemen for all railroads, \$80 to \$100 monthly. Age 18 to 35. Experience unnecessary; no strike. Promotion, Engineer, Conductor. Railroad Employing Headquarters—over 400 men sent to positions monthly. State age; send stamp. Railway Association, Dept. 89, 227 Monroe Street, Brooklyn, N. Y.

CANVASSEERS, \$30-\$60 weekly selling distinctive, individually tailored raincoats. No capital required, pocket samples, prices low, whole or part time. Write Sanitary Coat Specialists, New York.

ENTER the Merchant Tailoring Business for yourself. Learn to cut men's clothes by our easy system. Big profits—no investment. Full particulars free. Write today. Success School of Cutting, Dept. 11, Jackson, Mich.

DRAFTSMEN—A few slightly soiled copies "Dimensions, Pipe Fittings and Valves" 30c. "Structural Drafting" 75c, both \$1. National Book Co., Collinwood, Ohio.

DETECTIVES earn from \$100 to \$500 per month. How much are you earning? Write for particulars. Interstate Detective School, Peoria, Ill. Suite 25, McDougal Bldg.

REPORT local information, name, etc., to us. Big pay. Confidential. Enclose stamp. National Information Sales Co., AFR, Cincinnati.

SECURE position you desire, get my book, explains how. Particulars free. Stafford Publishing Co., 44 Madison Ave., Bridgeport, Conn.

Distributors of advertising matter everywhere. American Distributor, Blairsville, Pennsylvania.

If you want help, tell your wants in 1,000,000 rural homes simultaneously. Use Bogge's Weeklies. Write for free result Checking Book. Use letterhead. Classified Dept., 500 Dearborn Ave., Chicago, Illinois.

BIG money collecting and selling names. Either sex, any locality. Send 25c (coin) for names of firms that buy names. W. R. Summerhayes, Tama, Iowa.

MEN and Women Wanted for Government Positions. \$90 month. Parcels Post means thousands of appointments. Write for list of positions open. Franklin Institute, Dep't K 21, Rochester, N. Y.

SONG Poem Wanted. New Plan. Big money. Free book tells all. Hayworth Music Co., 660 G, Washington, D. C.

WANTED—Railway Mail Clerks. \$75 month. Examinations everywhere. Coaching free. Franklin Institute, Dep't K 21, Rochester, N. Y.

WANTED—A high class reliable sales manager for a store fixture without competition. Commissions \$300 to \$500 per month. Address The Buckley Specialty Co., Lima, Ohio.

TRUSTWORTHY agent for ideal Raincoat proposition of highest order. Large commission basis; pays big. No cash with order. English Raincoat Tailors Co., Ltd., New York.

BE your own Master! Stop Wage Slavery! Formulas and instructions for manufacturing Six Big Sellers and 100 Business Opportunities sent for 10c. Particulars free. M. Iverson, 819 N. St. Vrain St., El Paso, Texas.

CASH for information, names, formulas, and ideas. Steady, profitable home business. Instructive booklet for stamp. Information System, 288, Marietta, Ohio.

START "New Specialty" mail order business at home evenings and spare time. Very profitable. Everything furnished Particulars free. Box 134A, Newport, Ky.

SALESMEN to sell guaranteed brooms. Stores or private. Good commission. Excellent opportunity. Palma Atlas Broom Works, Palm, Penna.

WANTED—Distributors, men or women to give away free packages our famous Perfumed Borax Soap Powder; no money or experience needed; good pay. Ward & Co., 1775 Berneau Ave., Chicago.

ANY intelligent person many earn good income corresponding for newspapers. Experience unnecessary. Address Press Correspondence Bureau, Washington, D. C.

EARN \$7 to \$12 daily, restoring faded colors in rugs and carpets. Whole or spare time. Original American Process. Great demand. No capital. Full particulars free. Eldred, Dept. 75, Detroit, Mich.

MAKE \$30 to \$60 weekly—Representing us. Permanent business with dignity and prestige. Standard Safety Lamp Co., 157 W. Randolph Ave., Chicago, Ill.

MAKE \$10 daily restoring colors to faded rugs and carpets. Spare time. Tremendous opportunity everywhere. Simple, easy. Mirror Silvering course free. Free particulars. Coxe, Dept. MD., Omaha, Neb.

WANTED—Hustling man, every town, and country community. Who wants to get ahead, learn, and earn more. Fine chance. Write quick for full particulars. Box A2-293, Covington, Ky.

LADIES—Earn money coloring pictures and postcards; samples and instructions. 20c. Dept. 61, Roxbury Card Co., Roxbury, Mass.

HERE'S Your Chance—Full course of instruction in Silvering Mirrors, for 50 cents. Max Swift, 158 Suffolk St., New York City.

SALESMEN—Several good men; oils, paints; no experience. Signet Oil Co., Cleveland, Ohio.

GOVERNMENT Examinations. Most thorough preparation; \$5; returned if not appointed; particulars free. American Civil Service School, Washington, D. C.

WANTED one thousand chauffeurs and repair men. Our demand for automobile engineers exceeds the supply. Calls for men of intelligence and mechanical bent capable of commanding \$100 to \$150 per month upon graduation. Resident course \$20 to \$60. Home Correspondence course completed by practical road and shop work at this school, highly successful. Look this up. Auto Schools of America, Dept. T, 1660 Michigan Ave., Chicago.

WANTED—Agents, Machinists, Attention! Increase salary, new revised Saunders' Hand-Book of Practical Mechanics. Best ever ready reference. Thousands in use. Postpaid \$1 cloth; \$1.25, \$1.50 leather flap. Big profits. E. H. Saunders, 216 Purchase St., Boston, Mass.

WANTED—A man or woman, all or spare time, to secure information for us. Work at home or travel. Experience not necessary. Nothing to sell. Good pay. Send stamp for particulars. Address M. S. I. A., 522 L Building, Indianapolis, Indiana.

THE demand for cartoonists is increasing. Many young men have talent, but not the opportunity of developing it. We can suggest an inexpensive method that will aid anyone anxious to take up the study of drawing. Send your name and address to box 223, Glencoe, Ill.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

GO on the Stage. Vaudeville career offered you. Experience unnecessary. Managers endorse my method. Instructive vaudeville book free. Write today. Frederic LaBelle, Sta. 10, Jackson, Mich.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

DON'T fail to read Independence and Fortune under Business Opportunities.

MEN and boys to learn automobile repairing, driving on up-to-date cars; electricity, civil engineering, surveying. Methods most practical. Room and board while learning. Positions secured; satisfaction guaranteed; catalog free. National School of Engineering, 2110 W. 7th, Los Angeles.

WANTED—First Class Gridley and Brown & Sharpe Automatic Screw Machine Operators, also Hand Screw Machine Operators and Tool Setters. Apply by letter to the Employment Department, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

WANTED Salesmen—Earn \$250 per month, sell dealers highly advertised article. Samples not necessary. Elato Co., Station L, New York, N. Y.

YOU can make big money writing letters for us during spare time. We furnish everything. International Mercantile Alliance, 125 Bloomfield Street, Hoboken, N. J.

BE a Detective—Earn \$150-\$300 monthly. Greatest opportunities. Write Frederick Wagner, 1243 Lexington Avenue, N. Y.

SITUATIONS WANTED

INVENTOR desires position with manufacturer or such. G. A. Rousseau, 12 Harmony St., New Bedford, Mass.

WANTED—Position as trench-machine operator. Experienced on Austin. H. Diggins, Harvard, Ill.

EXPERIENCED mechanical inventor desires position; very practical and original. A. Payne, Duncan, B. C. Can.

MACHINERY, TOOLS AND SUPPLIES

FREE—"How to Run and Install Gasoline Engines." Greatest little book ever published on this subject, sent free with year's subscription to Gas Energy. Learn how to solve all knotty Gas Engine problems in few moments. O. L. Stevens, Ind., writes, Gas Energy is best magazine published. Send 50c for year's subscription. Book free. Gas Energy, 28 Murray St., New York.

LATHES 11 to 30 inch, millers, drills, shapers, wood working machinery, new combination woodworker, jointers, sanders, punches and shears. Bicknell, Janesville, Wisconsin.

ONE seven hp. Portable Coil Boiler \$20. One seven hp., two cylinder steam engine \$20. Used very little. Sandusky Vulcanizing Co., Sandusky, Ohio.

PULLEYS, Gears, Sprockets, Shafting, Hangers; see page 132. W. A. Jones Foundry & Machine Co., Chicago.

40 H. P. OIL Engine, used but little. Guaranteed as good as new. Geo. A. Peckens, Fowlerville, Mich.

MECHANICS' Tool Case, Yours free for a little work. Particulars for stamp. H. L. Depay, Muncie, Ind.

HOW to make Dynamo—and Digest Publishing 100 Mechanical Kinks, etc., monthly. One year, 25c. Digest, Grand Rapids, Mich.

1½ H. P. GASOLINE engine complete on skids. Practically new \$20. A. M. Kirk, 6733 Vincennes Ave., Chicago.

FOR Sale—Flour City 11x14 portable gasoline engine \$285. Fred Fuller, Lafayette, Ill.

LATHE for Sale—10x36 in. Nearly new, Harlan Edgington, Mapleton, Iowa.

FOR Sale—1 Buckeye Steam Engine, 12 x24, Automatic Cut-Off, only six weeks in use; 1 Boiler 66" x 18ft. Must be sold since we are going out of business. Apply National Box Co., Cleveland, O.

MACHINISTS, send for free treatise "How to turn up or repair a crankshaft" with Warnock's combination lathe dogs. H. A. Warnock, Chicago, Ill.

WE pay Cash for second-hand or new machinery, motors, belting. We will buy one machine or entire plant. Lambert & Co., 241-243 Centre St., New York.

BARGAINS in new and second-hand stationary gasoline engines. Affiliated Mfgs., Milwaukee, Wis.

FOR Sale, Pratt & Whitney 2" cutting off machine, in perfect condition, \$35. Lucas & Son, Bridgeport, Conn.

ELECTRIC motors, Bargains up to one H. P., new, stamp. 2643 E. Union, St. Louis.

FOR Sale, Air cooled engine 4 cyl. 24 hp. complete; bargain. Write H. Schaefer, Box 407, Cresco, Iowa.

LATHE screw cutting, 19" by 11" \$185. Pinner, 122 Water Street, New York City.

SCREW machine wire feed 1" capacity \$200. Pinner, 122 Water Street, New York City.

30 HORSE Power vertical engine \$175. Pinner, 122 Water Street, New York City.

FOR Sale—Gasoline engines, automobiles, marine and stationary, also castings. Second-hand ones taken in exchange and for sale. Apply with stamps. B. W. Richardson, R. No. 36, Peoria, Ill.

REBUILT Engines—We have on hand a number of rebuilt "Buffalo" engines, guaranteed, at greatly reduced prices. Write for bargain list. Buffalo Gasoline Motor Co., 1293-1305 Niagara Street, Buffalo, N. Y.

FOR Sale—Engine lathe, swings 9½ in. takes 25 in. between centers. Complete with full set change gears to cut all size threads, 3 to 40 in.; price only, \$43.50. Address L. P. Grammes & Sons, Allentown, Pa.

LATHE for sale—For bargains in small lathes write South Bend Machine Tool Co., Dept. L, South Bend, Ind.

SCREW Machine, Hartford, 1½ in. capacity, \$125; 14 inch speed Lathe, \$22. 3145 Penn Avenue, Pittsburgh, Pa.

PATTERN makers! A book devoted to the principles of pattern and core making and molding. Written by G. H. Willard, a practical pattern maker of years experience. This book, just published, treats the subject in a much more simple, direct and effective manner than most books along this line. 224 pages, 312 illustrations. Price \$1 postpaid. Popular Mechanics Book Dept., Chicago.

SERIES of 7 lithographic models—Steamship, automobile, gas engine, steam engine, steam turbine, wireless telegraph and dynamo. Size 8x14 inches. All parts of these machines are shown and numbered to correspond to printed keys of names. Price each, 50 cents postpaid, or set of 7, \$3 postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

THE latest improvement in Test Indicator, every machinist and toolmaker should send for booklet. C. E. Robinson Co., 96 West River St., Orange, Mass.

MANUFACTURING MACHINERY

WE manufacture anything, can furnish patterns, of brass or wood. Castings in brass or cast iron and aluminum. Our shop is equipped with heavy engine lathes, drill presses, new milling machines, (universal). Quotation furnished without cost to you. Write. Practical Gas Engine and Machine Works, North Chicago, Ill.

WE make working models of any description, also tools, dies, punch-press work, and special machinery. Send us drawing or rough model for estimate. Send for catalogue of model supplies. The Pierce Model Works, 3405 Pierce Ave., Chicago, Illinois.

MANUFACTURER of brass specialties having ample capital and excellent selling facilities, wishes to take up patented article in brass on royalty basis. Send full description of article. Address E. H. Heller, Sec'y, 18 E. Kinzie St., Chicago, Ill.

SPECIAL machinery designed and built, ideas developed on contract. Estimates from blue prints or sketches. G. Lange & Co., 635 W. 49th Street, New York City.

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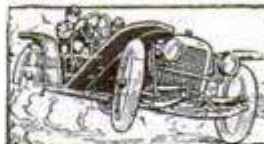


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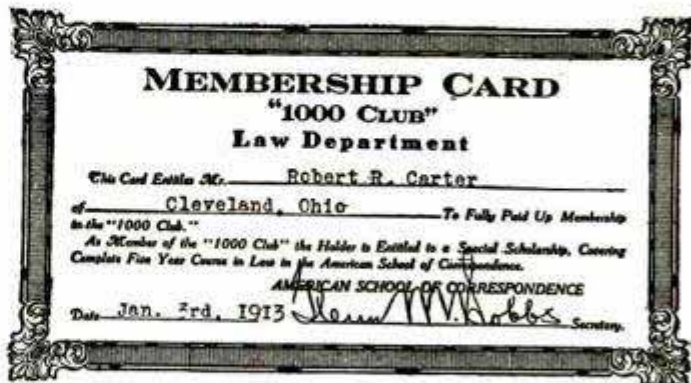


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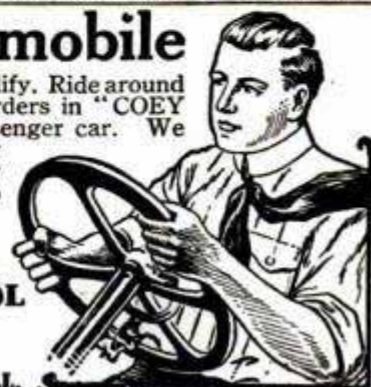
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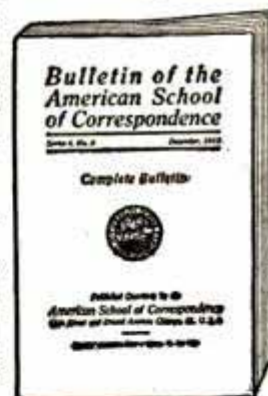
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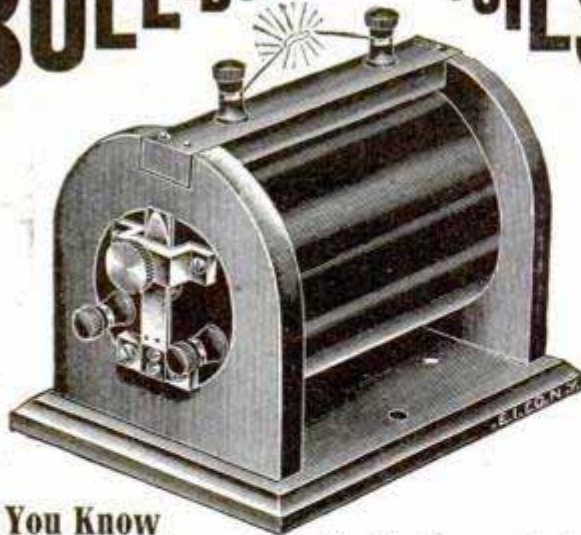
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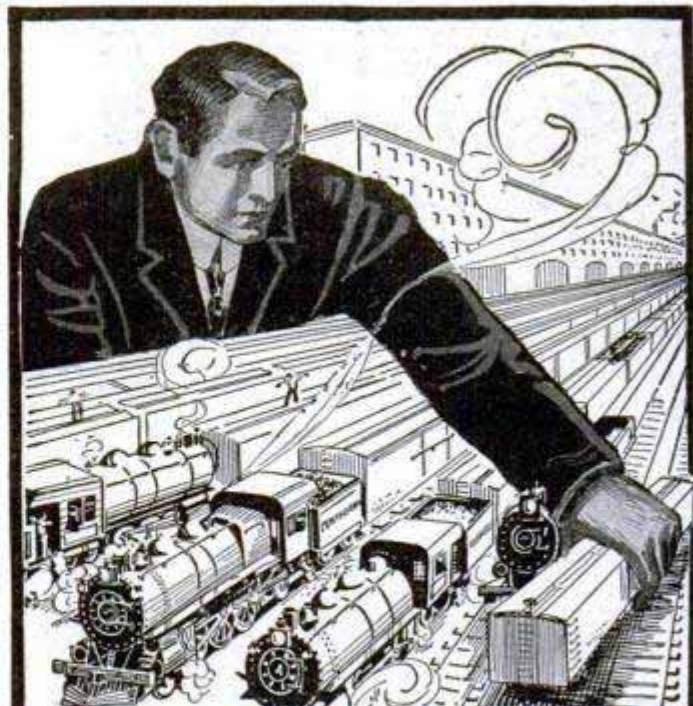
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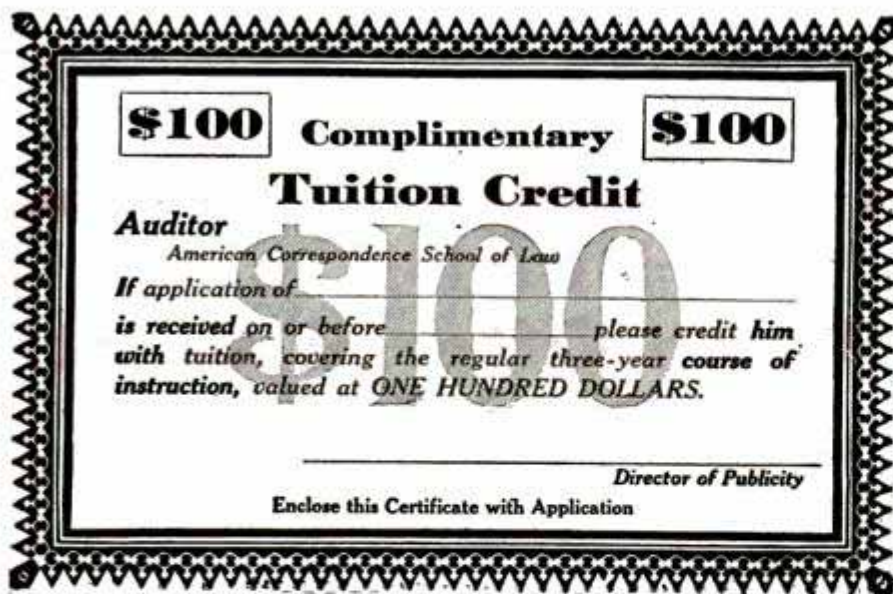
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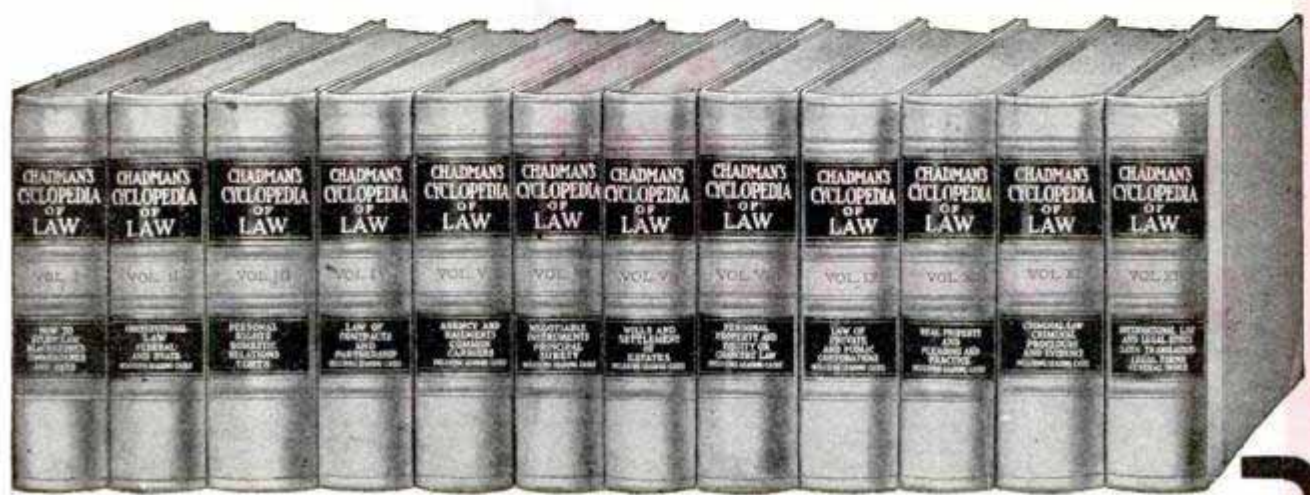
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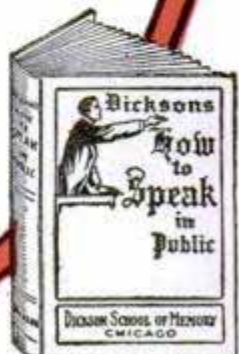
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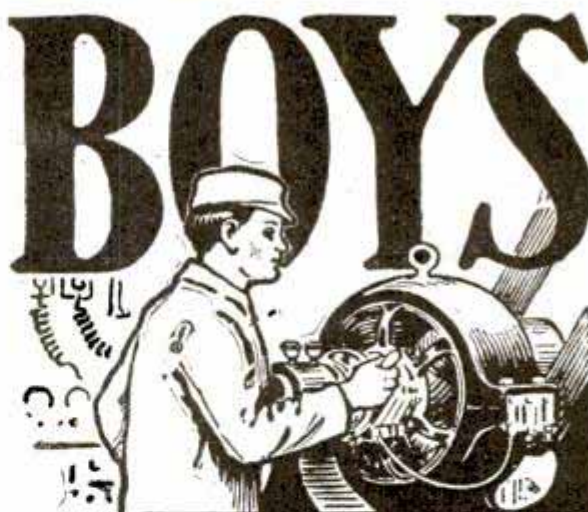
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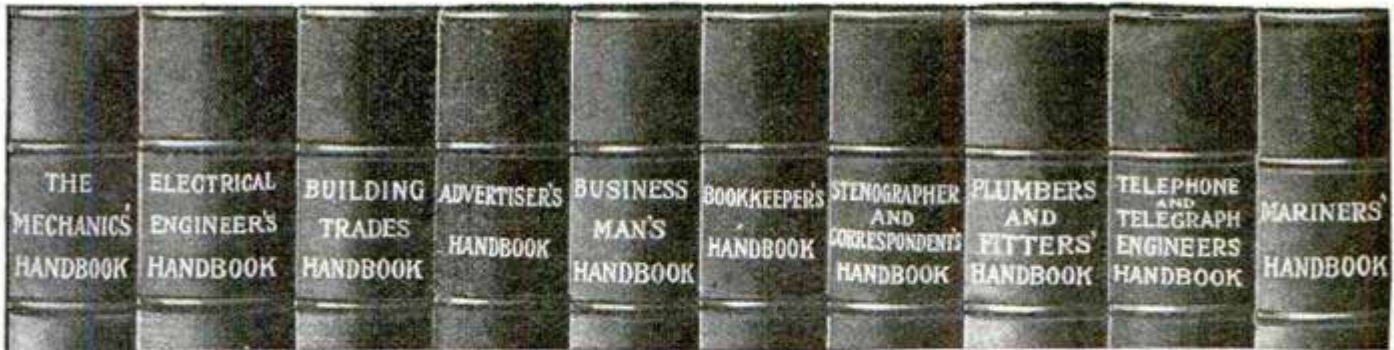
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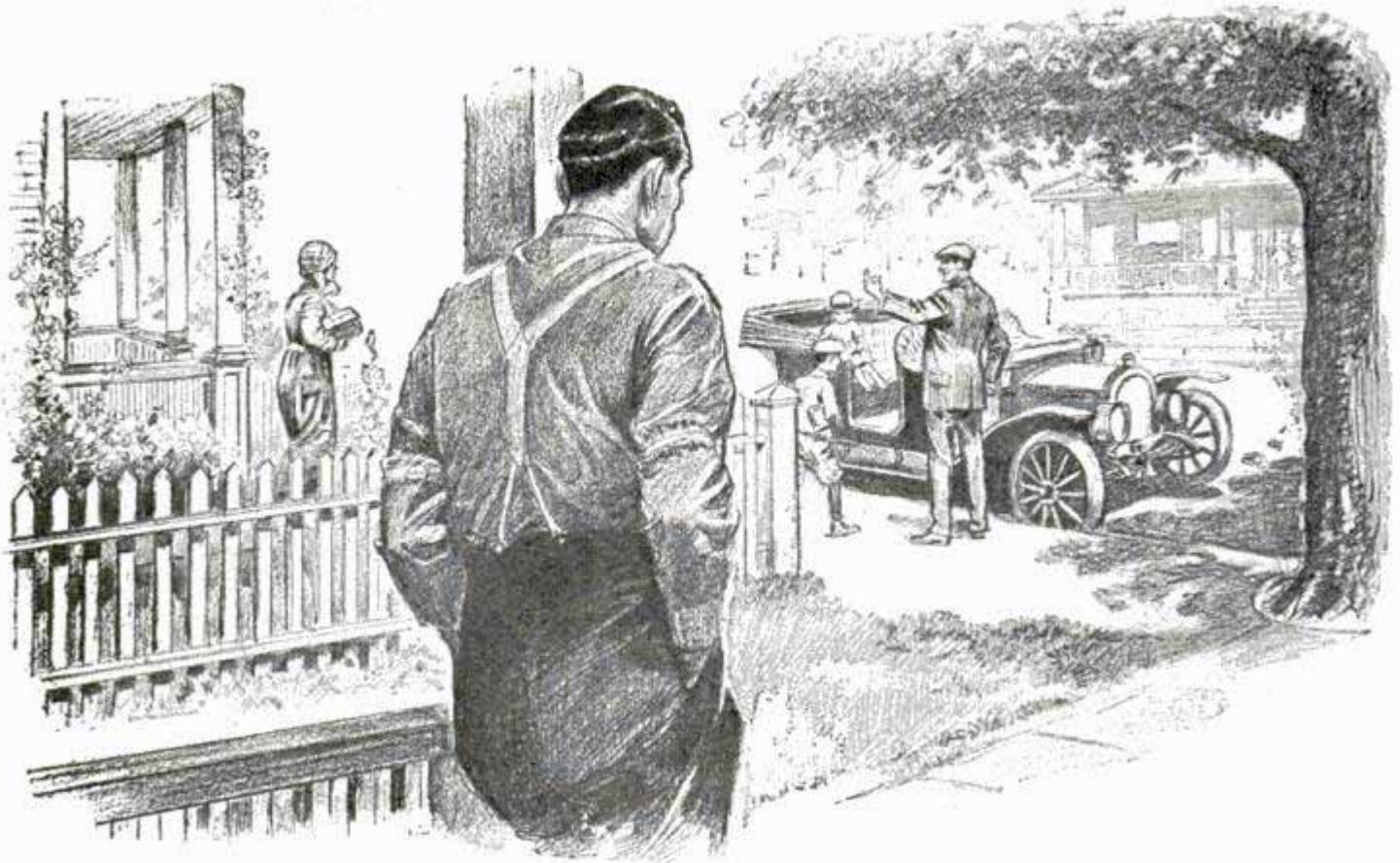
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